A COST ANALYSIS OF THE MILITARY RETIREMENT SYSTEM

THESIS

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AFIT/GCA/ENV/04M-06

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Wright-Patterson Air Force Base, Ohio

AFIT/GCA/ENV/04M-06

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THESIS

Presented to the Faculty

Department of Systems Engineering and Management

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Cost Analysis

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March 2004

AFIT/GCA/ENV/04M-06

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AFIT/GCA/ENV/04M-06

Abstract

This research explores possible changes to the current military retirement system. The research contains a detailed explanation of the current military retirement system and its objectives; a summary of the history and past legislation affecting private sector pension plans and the military retirement system; and a discussion of major analytic studies of the military retirement system since 1969 and their impact on the current system. The costs and benefits of three alternatives to the current system are analyzed using a deterministic and stochastic analysis. These alternatives are based on benefit structure changes not explicitly reducing costs. System restructuring would change the emphasis from cutting benefits to keeping costs constant (or lower) with an equal (or greater) benefit level. This restructuring approach is based on three defined contribution options that have varied contribution percentages. The contribution percentages are designed to provide different levels of incentive for continued military service. The analysis demonstrates that each alternative is an attractive consideration for the DoD because the alternatives are aligned with the objectives of the military retirement system, cost the government less to administer, and provide greater benefit annuities to the service member.

Acknowledgements

       I would like to express my sincere appreciation to my faculty advisor, for his guidance and support throughout the course of this thesis effort. I would also like to thank my thesis readers, who gladly provided information and advice that were invaluable to the research and calculations performed. Finally, I would like to thank my wife, for being there when I needed her the most; without her support, none of this would have been worth it.

       Kyle R. Martin

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1.   Introduction

1.1   Background

As the War on Terror successfully continues, public support for the military has

reached one of the highest levels ever seen. In fact, public support for the military has

not seen such a high level since the days of World War II (20). There is no doubt the

United States no longer simply faces threats from other nations, but threats from terrorist

groups all over the world that wish to destroy our way of life. At the same time, we

continue to live in a world where corporate businesses and the federal government strive

"to do more with less". Specifically, the Department of Defense (DoD) continues to

search for efficient ways of conducting operations that meet national security objectives

in a cost effective manner. All lines of business in the DoD have been scrutinized;

including defense weapon system acquisition, traditional operating and support functions,

education and training, and personnel pay and benefit packages. One benefit afforded to

military members that has been constantly scrutinized is the military retirement system.

The military retirement system is a number of separate programs that provide

benefits to different categories of military personnel, their dependents, and their

survivors. The military retirement system consists of three main areas: a pay annuity, a

health coverage benefit, and base services including commissary/base exchange (BX)

privileges. The military retirement system includes the following different programs:

- Nondisability retired pay, for active-duty personnel who complete "full careers" and retire without disability;

- Disability retired pay for active-duty members who, because of disabilities, are separated from active duty before they do or do not complete full careers;

- Dependency and indemnity compensation, a longer-term payment to survivors meant to compensate for losses associated with "service-connected" deaths;

- Nondisability separation pay, for officers and Reserve enlisted personnel involuntarily separated from service before the end of a full career;

- Disability severance pay, for active-duty members separated from service because of minor disabilities insufficiently severe to qualify them for disability retired pay;

- Survivor benefits, an elective program under which a member can contribute part of his pension and so qualify his surviving dependents for an annuity linked to the level of the member's retired pay; and

- Group life insurance, and elective, contributory program of privately underwritten term life insurance in which the federal government pays any additional hazard costs associated with military service (45).

Military personnel also accrue Social Security benefits on the basis of their military

wages. In addition, a Reserve retirement program applies to members who complete full

careers as members of the Reserve components, whether they began as active-duty

members or as reservists.

Efforts at modifying the military retirement system in recent years have not been

limited to the nondisability retirement portion. Growing dissatisfaction with the survivor

benefit plan, evidenced by falling participation rates, led in 1980 to Congressional

revision of the program to make benefits more generous (26). The Reserve retirement

program has been the subject of reform proposals from both internal DoD working groups and external critics. Extension of separation pay to involuntary separates from active enlisted service has been recommended by at least one study group, as has revision of the formula for computing separation pay.

Most attention, however, has focused on the nondisability retired pay program for active-duty personnel. As is evident from Figure 1 and Figure 2, this program is the largest component of the overall program in terms of both number of beneficiaries (1.6 million out of a total 2.0 million retirees) and cost (an estimated $31.2 billion for fiscal year 2001, 90 percent of the $34.6 billion total cost of military retirement) (44:2). Moreover, since the formula for nondisability retirement benefits is used to calculate disability retirement, Reserve retirement, and survivor benefits, the costs of these programs is a function of nondisability retirement. Perhaps most important, the nondisability retirement program is often criticized on equity grounds, since beneficiaries usually begin to receive annuities at much earlier ages than most civilian members of the labor force.
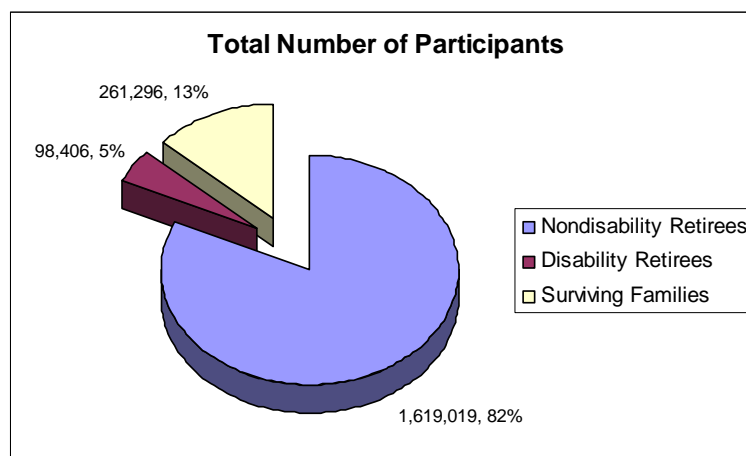
Figure 1: Retirement System Participants.

Total Annual Retired Pay ($ billion)

2.04, 6%

1.32, 4%

Nondisability Retirees

Disability Retirees

Surviving Families

31.2, 90%
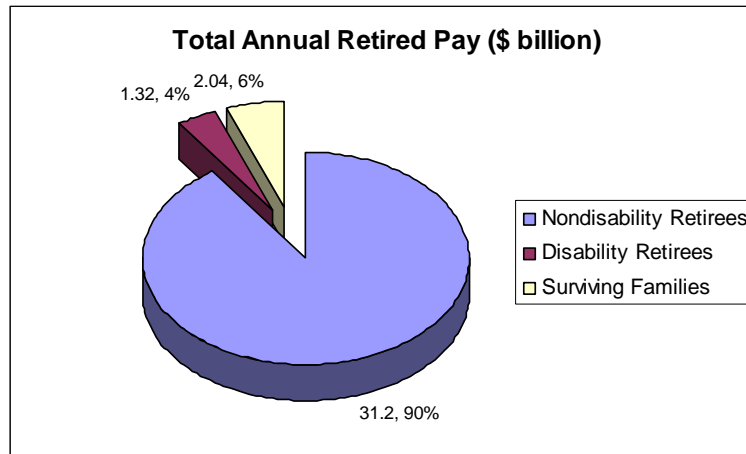
Figure 2. Retirement System Annual Costs.

1.2 Problem

For more than 30 years, the military retirement system, in particular, its central feature of allowing career personnel to retire at any age with an immediate annuity upon completing 20 years of service has been the object of intense criticism and equally intense support among military personnel, politicians, and defense manpower analysts. Critics of the system have alleged, since its basic tenets were established by legislation enacted in the late 1940s, that it costs too much, has lavish benefits, and contributes to inefficient military personnel management by inducing too many personnel to stay until the 20-year mark and too few to stay beyond the 20-year mark (15:2). At present, too few people are willing to make the commitment to stay the full 20 years, causing DoD to lose too many talented people in the 8-12 year range. In addition, the requirement for officers to perform a certain amount of joint (inter-service) duty, plus acquiring a well-rounded competence in their own services' capabilities, has created a situation in which 20 years is simply not enough time for an officer to serve in enough jobs to learn all that

is needed to prepare for higher command and staff duties. This allegedly shows a need for more officers to serve well past 20 years. In fact, the mandatory joint duty requirements are the only new factor in this issue. Many analysts, however, feel that the joint duty requirements have, in connection with other duty required an officer to attain a sufficient level of competence in his or her grade, simply made a 20-year career incapable of attainment – all of the service requirements cannot be "crammed into" 20 years (13:5).

Others have strongly defended the existing system as essential to recruiting and maintaining sufficient high-quality career military personnel who could withstand the rigors of arduous peacetime training and deployments as well as war. They tend to agree with the statement that "20-year retirement makes up with power what it lacks in subtlety," by providing a 20-year "pot of gold at the end of the rainbow" (30:5). Without the latter, it is argued; too few personnel would be willing to put up with the great stresses of a military career. At the same time, the incentive to depart soon after reaching the 20-year mark supposedly prevents the armed forces from being saddled with over-age and unfit officers and NCOs, unquestionably a major problem in the early stages of both World Wars. Since 20-year retirement was adopted in the late 1940s, the latter problem has not surfaced when United States forces have been in combat. It is also suggested that DoD already has the tools to cope with the problems of insufficient retention of middle-grade personnel and with overloaded officer career patterns: the former by using special pays and bonuses and adequate overall military compensation and the latter by exercising existing discretionary authority in statute to keep more personnel on active duty well past the 20-year mark.

Congress confronts both constituent concerns and budgetary constraints in considering military retirement issues. The approximately two million military retirees and survivor benefit recipients, and their roughly six to eight million family members, have been, and continue to be, an articulate and well-educated constituent group familiar with the legislative process and represented by associations staffed with military retirees with long experience in working with Congress (30:1). In recent years, the long-standing efforts by military retirees and their associations to secure more benefits for their members have been reinforced by; (1) the outpouring of nation-wide nostalgia and support for the past heroism and current old-age needs of the "greatest generation" of World War II-era veterans, whether retirees or not; (2) concern over problems the military services were having in recruiting and retaining sufficient numbers of qualified personnel, which began in the mid-1990s, and the extent to which actual or perceived inadequacies in retirement benefits may have been contributing to these problems; (3) the impression of many current or former military personnel that the Clinton Administration was not favorably disposed toward the military as an institution, leading to efforts to portray increased retirement benefits as a palliative measure; and (4) efforts to obtain more benefits from the Bush Administration because it is perceived as being pro-military (30:1). As mentioned earlier, there has been a predictably dramatic increase in public and congressional support for the Armed Forces.

Because Congress views retirees as constituents, in recent years Congress has been more aggressive than the executive branch in responding to the stated concerns of retirees about their benefits. At the same time the DoD views retirees as a cost without benefit; therefore, the DoD and other executive branch agencies have, over time, tended

to regard military retirement benefits as a place where substantial budgetary savings could be made. For instance, Congress took the initiative in 1999 to repeal the "Redux" cuts in future military retired pay that was originally enacted in 1986.

Secretary of Defense Rumsfeld and other senior defense officials have suggested on several occasions that the existing 20-year retirement paradigm should be modified. In general, though, they have cautioned, that they do not want to cause undue alarm, or negate individual career decisions already made, by introducing such changes too abruptly. Discussion about such "reforms" – i.e., cuts in retired pay entitlements was muted in the aftermath of the September 11, 2001 attacks. However, there have been recent rumors that senior DoD officials want to initiate pilot programs that would modify the 20-year retirement program for some particular occupational skills, in particular services, beginning in 2003 (i.e., during consideration of the Department's FY2004 budget). These would possibly include longer terms of service for general and flag officers; allowing some personnel in specialties that require a great deal of training investment to stay on active duty, without being forced out of service well past the 20-year mark; and providing additional severance-pay type benefits for some personnel whom the services do not need to stay as long as 20 years (30:5).

1.3 Scope

This research is limited to an analysis of nondisability retirement pay. As is common in discussions of this program, it is referred to as the military retirement system. Additionally, this study does not assume any changes in the rest of the military compensation system. Along with retirement, military personnel receive a wide variety

of pay and benefits. All members receive a cash "basic pay" determined by their rank and length of service. Some also receive cash allowances for housing and food, which are exempt from federal taxes; others benefit from housing and food provided by the military. Selected numbers also receive additional pay or bonuses aimed at retaining personnel with special skills. The analysis in the remainder of the Thesis assumes that these pay and allowances remain roughly at their current levels in real terms (that is, after adjustment for pay raises designed to keep pace with pay increases in the private sector).

This thesis investigates the cost of several different military retirement system options. These options are based on benefit structure changes not explicitly reducing costs. System restructuring would change the emphasis from cutting benefits to keeping costs constant (or lower) with an equal (or greater) benefit level. This restructuring approach is based on three options that have varied contribution percentages. The contribution percentages are designed to provide different levels of incentive for continued military service. Eligibility for benefits of each option would be based on the number of years completed by the service member. If the service member separates from the service before the normal 20 year service point, then the money contributed by the member and the corresponding contribution by the government would be immediately available to the service member after separation from the service. Each option consists of varying the percentages of basic pay contributed using member contributions, government matching contributions, and government vesting contributions. This research will be limited to exploring cost-for-benefit tradeoffs. The options are presented in Figure 3, Figure 4, and Figure 5. These options will be evaluated and measured against the current cost and benefits of the military retirement system.

Member Contribution	5%
Government Matching Contribution	5%
Government Vesting Contribution	
YOS	
0	0%
1 - 5	5%
6 - 10	10%
11 - 15	15%
16 - 20	20%
21 - 25	15%
26 - 30	10%

Figure 3. Alternative Retirement System Option #1 Contribution Percentages.

Member Contribution	3%
Government Matching Contribution	3%
Government Vesting Contribution	
YOS	
0	0%
1 - 5	3%
6 - 10	6%
11 - 15	9%
16 - 20	12%
21 - 25	15%
26 - 30	20%

Figure 4. Alternative Retirement System Option #2 Contribution Percentages.

Member Contribution	3%
Government Matching Contribution	3%
Government Vesting Contribution	3% + 1% for each YOS

Figure 5. Alternative Retirement System Option #3 Contribution Percentages.

1.4 Approach

The research methodology will draw on previous government and private studies of military retirement compensation. Information will also be gathered from existing government documents, congressional records, and previous theses. This research will evaluate the cost and benefit differences between the current system and the three options. The three options will incorporate benefits into the military retirement system that are not currently charged to the Military Retirement Fund (43:B-6). This fund is where all the accrued money is "stored" until it is needed. At the present time, only pay annuities are funded through the Military Retirement Fund.

1.5   Limitations

Due to the sheer scope of military compensation policies, some issues will not be addressed in this study. This thesis concentrates on a cost analysis of military retirement and will not examine other military pay structures such as basic pay. The primary limitations and assumptions are listed below. Chapter 3 also describes secondary assumptions that are explained as they are encountered in the model implementation.

1. Selection rates for each retirement plan are not accounted for in the model. Comparisons made between the current retirement plans and the three alternative plans proposed are based strictly on cost and benefits provided to the average military member.

2. Only active duty nondisability personnel are included in the study.

3. Study periods of 20 years and 30 years were used for all benefit calculations. During each study period, the structure of the current military retirement plans and the three alternative plans proposed remain constant.

4. The model uses a deterministic analysis and Monte Carlo simulation to investigate the cost and benefits provided by the current military retirement plans and the three alternative plans proposed.

5. This study will not quantify systems proposed by other individuals for comparisons. The only comparisons made will be between the current military retirement plans and the three alternative plans proposed in section 1.3.

1.6   Research Objective

The objective of the Thesis is to explore alternate military retirement systems that reduce the cost to the government yet provide an attractive benefit package for military members and maintain current force structure requirements. Subsidiary research questions include the following:

1. What is the structure and logic of the existing retirement system for the United States military?

2. What retirement policies available in the private sector might be adopted for use by the United States military?

3. What will be the cost to the government for a new retirement system?

4. How will total compensation change for the average individual service member under each alternative retirement plan?

1.7 Overview

This thesis is divided into five chapters. The first chapter states the problem, establishes the need for addressing the problem, describes the methodology, and indicates the plan of development.

Chapter 2 is background necessary for the reader's understanding of the problem. This chapter contains a detailed explanation of the current military retirement system and its objectives. It also includes a summary of the history and past legislation affecting private sector pension plans and the military retirement system. The chapter concludes with a discussion of major analytic studies of the military retirement system since 1969 and their impact on the system.

The third chapter contains the methodology used to approach the problem. This section includes an explanation of the selected model and the parameters used in the model. Values of parameters are given along with the rationale behind their selection. Assumptions, data, and references used in the model development are also included. Finally, this section answers some of the sub-objective questions.

Chapter 4 contains the results of the research. The major results are displayed graphically as well as written to aid the readers understanding. Finally, Chapter 5 has conclusions and recommendations. The conclusions discuss the findings of Chapter 4.

The recommendations serve two purposes. First, ideas and questions brought up by the

research, which were beyond the scope of the study, are listed for further research.

Second, an alternative retirement system is recommended for implementation.

2. Literature Review

2.1 Background

Extensive analysis has been undertaken and effort expended in studying military

retirement compensation policies over the years. Numerous changes to the military

retirement system have been recommended. Emphasis has been given to changing

military retirement to a more flexible force management tool as well as reducing the cost

of retirement benefits. Several of the recommended changes have been sweeping while

others have only been minor adjustments. However, the majority of the

recommendations from these studies have not been acted upon and consequently the

military retirement system has remained fundamentally unchanged since the end of

World War II (12:xiii). This chapter contains a detailed explanation of the current

military retirement system and its objectives. It also includes a summary of the history

and past legislation affecting private sector pension plans and the military retirement

system. The chapter concludes with a discussion of major analytic studies of the military

retirement system since 1969 and their impact on the system.

2.2 Current Military Retirement System

An analysis of proposed changes to the military retirement system cannot be

meaningful without first understanding the objectives and provisions of the current

system. There are many entities, both governmental and private, that have offered

recommendation on, modifications to, and/or complete restructuring of, the existing

retirement system. One theme consistent to nearly all of the studies is an adherence to

the stated objectives that the DoD retirement system is tasked with achieving. The

objectives are based on the military retirement system meeting the needs of both the

nation and its military service members. From the *Military Compensation Background

Papers* produced by the Office of the Secretary of Defense, the military retirement

system objectives are the following:

- The provision of a socially acceptable level of payments to former members of the armed forces during their old age.

- The provision of a pool of experienced military manpower that can be called upon in time of war or other national emergency to augment the active duty forces of the United States.

- The provision of a retirement system that will enable the armed forces to remain generally competitive with private-sector employers and the federal civil service.

- The provision of a socially acceptable means of keeping the military forces of the United States young and vigorous, thereby insuring promotion opportunities for the younger members (26:50).

One can see from this list that the military retirement system is not solely intended for use

as a basis for paying retired service members a pension. The system must also serve as a

manpower control tool as well as being socially acceptable in terms of benefits provided

to the retiree and cost to the taxpayer.

Ironically, the military member's entitlement to retired pay is not a vested or

contractual right. At no time has it any cash surrender, loan, redemption, or lump sum

value (13:6). The member makes no contributions to any retirement fund for the military

retirement system, but may make contributions to the Thrift Savings Plan (similar to a

private sector 401(k)) to supplement their retirement income. At the present time, the statutes authorize payment of retired pay on a monthly basis but no provision is available authorizing retired pay in one lump sum nor has Congress provided any means to compute retired pay in a lump sum. Nonetheless, for the protection of dependents, Congress has provided for an annuity program, the Survivor Benefit Plan, under which a member of the armed forces is given the option to receive, upon retired status, a reduced amount of the retired pay due in order to provide annuities for specific persons.

Military retirement pay is not a pension, grant, or gratuity but is an emolument of and dependent upon the office held (11:15). The member has to serve at least 20 years to be eligible to retire from service and may request retirement at any time thereafter. He or she cannot start to draw retirement pay prior to retirement but may receive disability retirement pay prior to serving 20 years if found unfit. Entitlement to and computation of retired pay of military officers and enlisted members is a matter of statutory regulation wholly within the control of Congress. Accordingly, the right must be measured by the terms of the statute as applied to circumstances rather than by common law rules governing private contracts.

Unlike private pension plans, the structure of the military plan has been standardized for all personnel and all military services. There are three systems for computing regular, nondisability military retirement pay (45). The system that is used for each service member depends on the date the individual first became a member of a uniformed service. This date is referred to as the Date of Initial Entry to Military Service (DIEMS). The three systems are Final Basic Pay, High-Three, and the Military Retirement Reform Act (REDUX). A member with a DIEMS date prior to September 8,

1980 is under the Final Basic Pay system and receives 50 percent of their final basic pay after 20 years of military service plus 2.5 percent for each additional year up to the 75 percent maximum for 30 years of service. A member with a DIEMS date between September 8, 1980 and July 31, 1986 retires under the High-Three system. Retired pay is computed as 50 percent of the average of the "High-Three Years" (36 months) of basic pay for 20 years of service plus 2.5 percent for each additional year up to the 75 percent maximum for 30 years of service. The multiplier is applied against the average basic pay for the highest 36 months of the member's career. This typically, though not always, equals the average basic pay for the final three years of service. For those with a DIEMS date of August 1, 1986 or later, the member must make a choice during their 15th year of service. The choice is to retire under the High-Three system previously discussed, or receive a $30,000 Career Retention Bonus (CRB) and retire under the Military Retirement Reform Act (REDUX). The REDUX retirement system is computed as 40 percent of the "High-Three Years" (36 months) of basic pay for 20 years of service plus an additional 3.5 percent for each additional year up to the 75 percent maximum for 30 years of service. These three plans are summarized in Table 1 below.

Table 1. Current Retirement Systems.

Retirement Options Comparison			
	Final Basic Pay Plan	High-Three Years Plan	REDUX Plan
Basic retirement pay at 20 years	50% of the final pay	50% of the High-Three Years Plan basic pay	40% of the High-Three Years Plan basic pay
Additional retirement pay for every year over 20	2.5% (Max 75%)	2.5% (Max 75%)	3.5% (Max 75%)
Bonus in the 15th year	None	None	$30,000
Cost of Living Allowances	Equal to the increase in the CPI	Equal to the increase in the CPI	1% less than the increase in the CPI
Eligibility: date entered active duty	Before 8 Sep 80	After 7 Sep 80	After 31 Jul 86

The current statutory service requirement for military retirement is 30 years of active duty. Nonetheless, members and retirees frequently refer to the current system as the "20-year retirement" system. Even though members do not have the right to retire after 20 years but only to request retirement and transfer to Reserve status, in practice, virtually all requests for "early" retirement are granted routinely. The 30-year statutory requirement remains the basis for the notion that a "full" military career is 30 years.

2.3   History of Private Sector Pension Plans and General Provisions

In order to fully understand the concern over the military retirement system, it is necessary to be familiar with pension plans in general. By comparing the general principles of retirement income presented in this section with the provisions of the military retirement system in the previous section, the reader can better assess the concern over the military retirement system. This section provides historical background followed by general provisions of private pension plans.

Pension plans and general planning for retirement were not a major concern before the latter part of the 19th century. Prior to that time, older workers did not retire but remained on the job until death or disability removed them. Those workers who were disabled relied on personal savings, relatives, and public or private charity as means of support (50:2). Society had no apparent need or desire to formally plan for the support of workers unable to stay on the job.

This lack of formal retirement planning was not the result of a heartless society but stemmed from a combination of economic structure, the basic societal attitudes toward work, and average life expectancy. The economy of the United States in the early

19th century was still largely based upon agriculture and as such there was little need for retirement programs. According to Schulz one reason for this was that in an agrarian economy people could always work in some capacity, if only at somewhat less productive tasks (50:3). For example, an aging farm worker could shift from field work of planting and harvesting to less strenuous activities of tending livestock and preparing food rather than giving up work entirely. This desire to remain on the job was caused partially by a need for productivity, but also by the Protestant work ethic (35:55-57).

Greenough and King noted that the Protestant work ethic was a driving force in keeping workers on the job for life. Failure to continue to work in some capacity was considered to be a sign of laziness and weakness. Therefore, it was not uncommon to find the elderly hard at work until the day of death. A factor that reduced the impact of this trend was that the life expectancy was much lower than in modern times (34:29).

As the level of industrialization increased, the aging worker found it more difficult to keep pace with the demands of the job. As noted in one source, "only a young man in his vigorous prime could keep up with the implacable, constantly increasing pace of the mechanized conveyor lines" (16:412-413). The worker now found himself in a position where he could no longer remain at the job until death. There was a point where he was "getting too old to work, yet with increasing life expectancy, too young to die" (16:413). The problem was to determine how to provide for the increasing number of workers "too old to work".

An answer came to this problem came in the form of pensions. The first pensions in the United States were found in the railroad, banking, and public utility industries shortly after the Civil War (41:11). The American Express Company has been credited

with establishing the very first plan in the nation in 1875 (2:1). However, these early plans were found to be highly discretionary with respect to the employer. "Early industrial pension plans were viewed as gratuities or rewards to employees for long and loyal service to the employer" (2:14). The employee found himself without any enforceable rights to the benefits of pension plans (1:5). One major reason for this situation was that almost all of these early plans were completely financed by the employer and thus termed non-contributory since the employee made no contributions (34:31).

The discretionary nature of these early plans combined with the fact that employers tended to use the plans as a means of controlling the labor force resulted in the concept of business expediency being applied to the growth of early pensions. The implication was that management's sole motivation in establishing a pension plan was the economic benefit that could be derived from the plan and not the economic well-being of the employees. However, as more pension plans were established, "there was increasing interest in the view that employers had a moral obligation to provide for economic security of retired workers" (2:14). Many new pension plans were established and old ones improved during World War II, not as a means of increasing total compensation but complying with wage controls (47:5). Whereas most pension plans before the war had required employee contributions, the new plans developed during the war were for the most part non-contributory (18:82). This led to widespread acceptance of the deferred wage concept, since pension plans were developed to compensate employees who could not be given higher wages due to wage controls during World War II.

The deferred wage concept of pensions suggested an inverse relationship between wages and pension benefits. It was assumed that as more benefits were added to the pension package less money would be available for wage increases. Another concept of pensions was the human depreciation concept. This concept implied that human labor (like machinery) was consumed over a period of time and that the pension was a means to compensate for aging of the human body due to labor. The pros and cons of both concepts have been debated at length in various pieces of literature and at present the deferred wage concept has the most acceptance (2:14-16).

Prior to passage of the Employee Retirement Income Security Act (ERISA) in 1974 there was little standardization in private pension plans. The purpose of ERISA was to prevent misuse of pension funds and to protect the rights of pension beneficiaries (19:68). Nader and Blackwell indicated that millions expected pensions prior to the passage of ERISA, but never received them (42:1). Samuelson noted that before ERISA there were no benefits for employees of companies which went out of business and were unable to honor pension commitments to workers. He concluded that private pensions had been greatly improved by ERISA even though many had criticized the controls enacted by this law (49:62). Although ERISA did not require the establishment of a pension plan, it did set minimum requirements to be met by existing plans (51:8). Nevertheless, the provisions of different private plans vary considerably in terms of retirement age, eligibility, vesting, computation of benefits, financing, death benefits, and disability benefits.

The normal retirement age has been considered to be 65. This has been rather arbitrary since some workers at age 65 have produced the same or more than younger

20

counterparts. Conversely, others become marginal producers a number of years before reaching 65. Competent employees close to age 65 expressed concern because they would be forced to retire when they believed they could produce for a few more years. Meyer and Fox observed that concerns arose over the desire that retirement and benefits be available at an earlier age (40:1). While 65 is still considered the normal retirement age, many plans have been modified to allow retirement at age 60 or 55. Some plans have replaced the retirement age requirement with the provision that an employee may retire after a certain number of years service with full benefits. Mandatory retirement at a specified age after a certain length of service has been built into some plans (40:3-7).

The stated retirement age of a pension plan must be reached before a person can receive the pension payment, but there are also requirements concerning the right to participate in a pension plan. Greenough and King reported that some plans in the past were not available to employees in their early twenties because job turnover was high in that age group. This effort to minimize the administrative costs associated with short term employees involved a specified minimum age and length of service requirement (34:114). Because of ERISA, the highest minimum age and length of service requirements permissible are 25 and one year, respectively, for plans with eligibility for participation based on age and years of service (2:391). Allen, Melone, and Rosenbloom noted that certain workers (such as hourly workers or those above a maximum age) have been excluded from participation in the pension plans of some firms (2:22).

A choice of three methods for the vesting of employer contributions is allowed by ERISA. Depending upon the method chosen, partial vesting occurs between five and ten years of covered service and full vesting between ten and fifteen years (34:164). The

differences in vesting provisions between private and military pensions have been one source of criticism of the military retirement system, which will be discussed in Section 2.5 Major Analytic Studies of the Military Retirement System.

The goal of a pension plan has generally been to provide a retirement income benefit which ranges from 45 percent of earnings just before retirement for higher paid employees, to 70 percent for lower paid employees in conjunction with Social Security benefits (2:31). The amount of annuity provided by private pension plans is usually dependent upon the contributions made to the pension fund by or in behalf of the employee. There are a variety of methods in use to determine the amount of an individual's pension check (2:31-33).

Private pension plans are funded; that is contributions for employees are accumulated in advance of the time when retirement pensions are paid. Private pension plans have usually been administered by single employers or through multi-employer plans. Single employer plans may have been voluntarily established by the employer or may have been instituted because of collective bargaining. Multi-employer plans have usually resulted from collective bargaining. When a company in a multi-employer plan has negotiated a pension plan improvement its agreement may become the pattern for companies in similar industries. If only the employer contributes to the plan, it is considered non-contributory (47:5-6). This provides a tax advantage since an individual's contributions are considered income for tax purposes, but employer contributions are not taxable (50:115-116).

Firms have traditionally carried group life insurance to aid surviving family members, but the benefits of a deceased employee's pension plan have not been

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transferred to the survivors as a rule. ERISA has specified that plans must offer married

employees a joint-and-survivor annuity pension which pays the spouse half or more of

the pension of the deceased worker. However, the right to refuse a joint-and-survivor

provision has been given to the worker (51:14).

If an employee dies before retirement, many pension plans have provided for a

lump sum death benefit which may be paid monthly to the surviving spouse. These have

usually been funded by assets of the plan or through life insurance and have required

additional contributions by the employee (2:49-50). Some plans have merely refunded to

the survivor the employee's contributions (34:119).

Some companies have placed disabled employees on a retirement pension. The

normal requirement has been permanent and total disability with completion of at least 10

years of service. The purchase of disability insurance coverage has also been used by

firms to provide income for a disabled person until the age for receipt of a regular

pension has been reached (51:14). Disability benefits for military personnel are more

generous.

2.4 Military Retirement System History and Past Legislation

The principal motivations guiding the evolution of the military retirement system

have been to ensure that; (1) continued service in the armed forces is competitive with the

alternatives, (2) promotion opportunities are kept open for young and able members, (3)

some measure of economic security is made available to members after retirement from a

military career, (4) a pool of experienced personnel is available for recall in times of war

or national emergency, and (5) the costs of the system are reasonable (44:B-2). The history of the military retirement system shows an interplay of these considerations.

Present military retirement policies in the United States can be traced to the early English colonists who provided half-pay for those disabled in the wars against the French and Indians. The first general national pension law for disabled veterans was enacted by the Continental Congress on August 26, 1776 (27:VII-1). The law provided half-pay for life for all ranks. This and all other laws pertaining to military retirements until the days of the Civil War provided only for disability retirement.

A review of the significant legislation pertaining to military retirement since 1860 reveals certain elements which have enabled the government to maintain pensions as a discretionary tool used to control the size and composition of the military. These elements are retirement age, required length of service, and the power of involuntary separation. Over the years all of these elements have varied due to changing conditions.

With the outbreak of the Civil War, Congress began to raise an armed force to fight a war. The law makers approved a law entitled, "An Act for the Better Organization of the Military Establishment," which was approved by President Abraham Lincoln in August of 1861 (27:VII-2). This act was considered to be the first universal retirement law for the services and is generally regarded as the legislative base of the current retirement system. It was designed to provide for the retirement of Army, Navy, and Marine Corps officers who had engaged in military service for 40 consecutive years. There was no provision for retirement age. In fact, even meeting this requirement was no guarantee of obtaining retired status since a provision was included to limit the number of retired to less than seven percent of the total number of active officers. With respect to

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disability, a provision was included whereby a special board judged each case to determine if retirement was warranted. Even those who were placed on the retired list were subjected to reassignment to duty at the discretion of the President (4:289-291).

Within the next year, a retirement age of 62 was established by two separate pieces of legislation, one for the Navy and the other for the Army. In addition to establishing a retirement age, the total years of active service was increased to 45 years. An officer could retire upon meeting either requirement at the discretion of the government (7:596).

Less than 10 years later the ceiling on retirees was changed from seven percent of the total active officer force to a maximum number of 300. The same law reduced the active duty service requirement to 30 years and set retired pay at 75 percent of the pay of the officer's grade (38:3). In order to maintain the current force structure, the 30 year requirement was raised to 40 years in 1882 and included service in either volunteer or active forces as an enlisted man or officer. A mandatory retirement age of 64 years was established and for the first time officers in excess of required numbers could leave the service with benefits (3:118).

Retirement for enlisted personnel came in 1885 when it was provided they could apply to retire after 30 years of service and receive 75 percent of the pay and allowances of the rank they held at retirement (21:3). This law applied solely to the Army and was extended to cover the Navy in 1899. In 1907, the years of service requirement for officers once again fell to 30 years. Computation of the time could now include total combined time spent in the Navy, Army, or Marine Corps (5:1217-1218).

The question of involuntary separation was addressed at length in the Act of 4 June 1920. This act established provisions to classify all officers into one of two categories; A or B. Those in category A were to be retained in military service and those in category B were considered unfit for retention. After placement into category B an officer's record was further reviewed to determine if such placement was due to neglect, misconduct, or avoidable habits. If the decision was in the affirmative the officer was discharged with no benefits. If, however, the decision was negative, various options were presented to allow for a continuance of pension benefits (6:773-774).

The next major change came in 1935 when the active duty requirement was reduced to a minimum of 15 years to reduce the cluster of people who had entered the service during World War I (17:2). Legislation in 1940 maintained the 15 year minimum and established mandatory retirement ages to be effective in 1942 for years thereafter. All officers below the rank of brigadier general who reached the age of 60 faced mandatory retirement. Special provisions were included to provide for the promotion before retirement of anyone completing 28 years or more of service who had previously been denied promotion due to grade limitations (8:380).

The Officer Personnel Act of 1947 provided for the involuntary separation of those passed over twice for permanent promotion. Those who were eligible for retirement would be placed on the retired list and paid 2½ percent times years of service times annual basic pay of the grade held at retirement. Others would be honorably discharged with severance pay of two months pay for each year of service completed, not to exceed two years of pay. It also stated that an officer within two years of being eligible for retirement pay could not be involuntarily separated (46:804, 896-906).

The Army and Air Force Vitalization and Retirement Equalization Act of 1948 insured the standardization of retirement laws for all services. Provisions included voluntary retirement at 20 years of service, annual retirement pay computed at 2½ percent times years of service times annual basic pay of the grade held at retirement (not to exceed 75 percent of annual basic pay), and severance pay for officers involuntarily separated with one month's pay per year of service, not to exceed one year's pay (9:1084-1085). Severance pay was limited to $15,000 in 1962, but no other significant changes have been made to the length of service retirement system since 1948 (38:3).

Prior to 1958, retired pay was generally increased in direct proportion to changes in active duty pay. The practice was discontinued with the "Uniformed Services Pay Act of 1958" (P.L. 85-422), when it was realized that a single six percent cost-of-living increase would cost only $35 million, as opposed to $65 million for linking the retired pay to active duty pay (44:B-5). The six percent approximated the increase in the cost-of-living since 1955 when retired pay was last increased. In 1963, a permanent system of increasing retired pay (P.L. 88-132), based on a formula geared to increases in the cost-of-living, was adopted (44:B-5). In 1965, the adjustment mechanism was modified slightly (P.L. 89-132) (44:B-5). This system granted cost-of-living increases whenever the Consumer Price Index (CPI) went up at least three percent and remained up for three months. The benefit increase was equal to the percentage rise in the CPI. In 1969 (P.L. 91-179), an additional one percent was added to compensate for the fact that five months lapsed between the time that the index increased three percent and the time that benefits increased (44:B-5).

Effective March 1977, Cost-of-Living Adjustments (COLAs) were scheduled to occur every six months, on March 1 and September 1, to be reflected in checks issued those months and the additional one percent was eliminated (P.L. 94-440) (44:B-5). The cost of living increase effective March 1 was computed by calculating the percentage increase (adjusted to the nearest tenth of a percent) in the CPI from the previous June to the previous December. Similarly, the cost-of-living increase effective September 1 was obtained by calculating the percentage increase in the June CPI over the CPI from the previous December. In August 1981 (P.L. 97-35), once-a-year cost of living increases were implemented by eliminating the September increase (44:B-5). Full annual cost-of-living increases were given in March of each year based on the percentage increase in the CPI between the two previous Decembers.

The DoD Authorization Act of 1981 (P.L. 96-513) effected the first major change in the computation of retired pay since uniform voluntary retirement authority was adopted for all branches of service in the Army and Air Force Vitalization and Retirement Act of 1948 (26:520). Under the 1981 Authorization Act, the retired pay of any member of an armed force who first became a member on or after the date of enactment of the Act (September 8, 1980) was computed on the basis of an average of the member's highest three years of basic pay. This basis was commonly referred to as "High-Three". Persons who were members of the armed forces before the date of enactment were excluded from the new computational method for determining retired pay in order to avoid changing the retirement rules after members had made career decisions on the basis of preexisting retirement rules and out of concern that such a change could have an adverse effect on the retention of certain critical classes of

personnel (26:520). This significant change was brought about by fiscal pressures, a swelling national debt, and the accelerating costs associated with military retired pay. In August 1982, P.L. 97-253 created a temporary deviation to the calculation and timing of the cost-of-living increase. Consequently, in FY83 the increase was delayed until April and the full increase of 3.9 percent was given only to survivors, disabled persons, and non-disabled persons over age 61. Non-disabled retirees under age 62 received 3.3 percent instead of 3.9 percent.

Prior to 1935, the Navy had a pension fund which provided for payments to persons retired for disability whenever there was a sufficient amount in the fund (43:B-6). The income to the fund consisted of the Government's share of the proceeds from the sale of enemy or pirate ships captured by the Navy, and from interest received on fund investments. This fund was abolished in 1935, and the military retirement system moved to an unfunded or "pay-as-you-go" basis. In an attempt to further contain what was generally perceived as rapidly mounting military retirement cost liabilities, Congress enacted the DoD Authorization Act of 1984 (43:B-6). This Act adopted accrual based accounting and created the Military Retirement Fund. The Military Retirement Fund was created to provide a means for Congress to budget for future retirement costs associated with current manpower decisions. Adopting accrual based accounting allowed future retirement outlays to be recognized as a future liability. In addition, the accrual based accounting removed the volatility of retirement costs from the DoD. Thus, the total cost of current manpower decisions was evident. This funding law stated that the DoD would make normal cost payments into the fund and the Treasury Department would make payments from general revenues to amortize the unfunded liability. Public Law 99-661,

enacted in November 1986, mandated that two separate Normal Cost Percentages (NCPs) be used to compute the normal cost payment of the military retirement system (43:B-6). One NCP is for active-duty personnel and reservists (full-time) and the second NCP is for drilling reservists (part-time). These normal cost payments are designed to be sufficient to pay for the future retirement benefits for a cohort of new entrants. The unfunded liability exists primarily because such payments were not made in the past. The original funding law also established an independent three-member DoD Retirement Board of Actuaries, appointed by the President. The Board is required to set assumptions for determining the normal cost and unfunded liability, to review valuations of the military retirement system, to determine the method of amortizing unfunded liabilities, to annually report to the Secretary of Defense, and to report to the President and the Congress on the status of the fund not less than every four years.

The Authorization Act in 1984 also made three other changes to the retirement system expressly to reduce the cost of military retirement. These changes included: (1) "rounding down" to the next lowest full month to determine retirement pay multipliers, (2) "rounding down" to the next lowest full dollar for monthly retired pay, and (3) prohibiting retirees from basing their monthly retired pay on the preceding pay scale as adjusted for inflation (26:520). With the passing of Public Law 98-270, enacted in April 1984, the FY84 cost of living increase was eliminated and modified in permanent law. Under the modified system, the COLA equaled the percentage increase in the average of the CPIs for July, August, and September over the averaged indexes for the same three months of the prior year. These increases become effective for entitlements earned in December. Public Law 98-369 directed that entitlements for a particular month should be

paid at the beginning of the subsequent month rather than at the end of the month of entitlement and became effective with the December 1984 adjustment.

"Armed with information gained from the new accrual accounting system, Congress next took action to require a $2.9 billion reduction in nondisability retirement cost accruals for 1986" (26:523). The Military Retirement Reform Act of 1986 (P.L. 99-348) made significant changes to military retirement designed specifically to reduce cost. The features of the Act, commonly referred to as "REDUX," applied to those who first became members of the uniformed service on or after August 1, 1986. The same percentage multiplier of 2.5 percent was used to calculate the initial monthly retirement pay. However, the monthly retirement pay was reduced by one percentage point for each year that the member retires with less than 30 years of service. Once a retired member with less than 30 years of service reached age 62, his retired pay would be increased as if the reduction in the pay multiplier had not been in place. In addition, the COLA for this group no longer keeps up with inflation. Their retiree and survivor benefits are increased annually by the full COLA minus one percent. A one-time catchup is given on the first day of the month after the retiree's 62nd birthday. At this time, the retiree benefit (or survivor benefit if the retiree is deceased) is increased to the amount that would have been payable had full adjustments been made. Annual partial increases continue after this catchup. For persons entering the service prior to August 1, 1986, full COLAs are still applied to the retiree and survivor benefits.

The National Defense Authorization Act for Fiscal Year 1993 adopted early retirement authority for members with between 15 and 20 years of service at the discretion of each service (43: 55). The Act was initially effective through 1995 and was

meant to be used as a force management tool to assist the services during the active force drawdown period. In 1994, Congress extended the termination of this Act to October 1, 1999. A member whose application for early retirement is accepted becomes entitled to a reduced retired pay, effectively adjusting the multiplier for the number of years of service less than 20.

Public Law 106-65, enacted October 1, 1999, enhanced benefits for military members previously covered by the REDUX benefit formula (those who entered service on or after August 1, 1986) (43:B-5). At the 15 year-of-service mark, these (full-time) members now have the choice of remaining under the REDUX formula and receiving a $30,000 bonus, which is not paid out of the Military Retirement Fund, or reverting to the more generous High-Three formula. However, those who elect the bonus must commit to remaining continuously in service until completing 20 years or forfeit a portion of the $30,000. Part-time reservists previously covered by REDUX do not have the option of electing the bonus, and so automatically revert to the High-Three benefit formula.

Military retirement has undergone many modifications since its emergence in the mid-1800s. What started out as a piecemeal, service-specific system designed to assist each service with its personnel management, eventually evolved into the consolidated military retirement system that we know today. Many of the early modifications reflected the need to retain capable military personnel for the potential defense of the nation's interests. More recent modifications have been influenced by budget deficits, fiscal pressures, and an attempt to moderate the appearance of a retirement system that is perceived by many to be overly generous when compared to the private sector.

2.5 Major Analytic Studies of the Military Retirement System

The First Quadrennial Review of Military Compensation (QRMC I), completed in 1969, recognized that the preponderance of military retirees obtain second careers in the civilian sector of the economy (39:2). It concluded, however, that their second-career incomes were lower than those of their civilian counterparts (with similar age, education, and employment experience) because military skills were often not transferable to the civilian sector. Although QRMC I did not propose that the second-career income loss should determine the amount of the retirement annuity, it suggested several modifications of military retirement keyed to its findings regarding second-career income loss: lower immediate annuities for members who separate prior to "old age," separation pay for enlisted members as well as officers, and stronger incentives for longer military careers.

When the recommendations of QRMC I failed to lead to a legislative proposal, the Interagency Committee (IAC) was formed in 1971 to look again at the principles of military retirement (26:215). The IAC concluded that the retirement system should be structured to provide a stronger retention incentive for junior members who were not yet "locked in" by the 20-year system. To this end, it recommended providing benefits to all members who completed 10 years of service, although to qualify for an immediate annuity upon retirement they would still have to serve 20 years. The IAC also recommended sharp reductions in annuities for those retiring after only 20 years of service, to increase incentives to remain in the military for longer careers.

An internal DoD review of the IAC proposal led to the proposed Uniformed Services Retirement Modernization Act (USRMA) in 1974. The USRMA modified the IAC recommendations to make the changes less far-reaching, while retaining their overall

thrust in terms of retention incentives and equity. This proposal included provisions for improved vesting, more equitable severance pay, and would have reduced the costs of military pensions by reducing benefits for retirees with less than 30 years of service and by reducing benefits while Social Security payments were being received (38:6). The USRMA became a legislative proposal that was considered by Congress during 1974-1976. Hearings were held in both houses, but the bill was not reported and no floor action was taken.

Meanwhile, in 1973 Congress created the Defense Manpower Commission (DMC) to study the manpower requirements of the DoD (38:4-5). The DMC addressed the retirement system as part of its overall charter, paying particular attention to cost and the role of the retirement system in helping to achieve manpower objectives. The 1976 DMC report concluded that the current retirement system was neither consistent with DoD manpower requirements nor comparable to civilian plans, and that accordingly there was no justification for its retention. In its place, the DMC offered a proposal comparable with its other recommendations regarding military personnel and compensation, with the specific objectives of extending military careers to 30 years of service for most members, providing some benefits to those who left with fewer than 20 years of service, and reducing retirement costs (21:16-17).

The timing of the DMC report worked against its consideration. The DoD, which had begun its Third Quadrennial Review of Military Compensation in 1976, referred the DMC recommendations to QRMC III for review. The report of QRMC III, which simply endorsed the provisions of the Retirement Modernization Act proposal, was never

formally accepted or acted upon by either the outgoing or the incoming Secretary of Defense.

Instead, the Carter Administration created the President's Commission on Military Compensation (PCMC) in 1977 and charged it with proposing an "integrated, long-term plan for military compensation," including resolution of the purpose and design of military retirement (48:62). The PCMC approached the issue of retirement modernization from the standpoint of achieving manpower objectives. Like the DMC, it concluded that the retirement system conflicted with efficient personnel management in several ways and that military retirement should be modernized to reinforce other compensation elements in achieving manpower goals.

Specifically, the PCMC recommended partial benefits for those who leave with fewer than 20 years of service, to stimulate more to stay early in their careers (48:62-65). Additional benefits were proposed for those who leave after 20 or more years of service, to increase the incentive for longer careers. In addition, the PCMC recommended that, in return for reduced annuities; retirees could receive an "early withdrawal" of cash after as few as 10 years of service. This and other changes that made benefits available earlier in a career would have helped keep more journeyman personnel in the military.

The PCMC's recommendations, modified somewhat, were codified in the Uniformed Services Retirement Benefits Act (USRBA) proposed in 1979 (49:78). USRBA was intended to remedy the shortcomings of the retirement system identified by the PCMC: retention incentives that conflict with personnel management objectives, high cost, and inequities between younger and older separates and between military and civilian retirees.

Although USRBA promised savings in retirement costs and improvements in personnel management, the plan was politically unattractive for several reasons. The USRBA proposed to give all current service members a choice of remaining under the present plan or switching to the new one. While this provision would have minimized the adverse effect of the change on individual members, it would have maximized the transition costs of changing to the new system. Therefore, the cost savings would not have been realized for 20 or more years owing to the grandfathering of the entire active-duty force. In the interim, moreover, outlays would actually have increased as at least some active-duty personnel elected "early withdrawal" or lump-sum benefits prior to retirement. In addition, the changes in composition of the military forces that would have occurred under USRBA did not have the support of the services. Partly as a result, USRBA was never formally introduced in the Congress, and no hearings were held in either house.

Modernization of the military retirement system again became an issue in 1984 with the findings of the President's Private Sector Survey on Cost Control (PPSSCC), better known as the Grace Commission. In its report on federal retirement systems, the PPSSCC urged reform of the military retirement system to bring its benefits more closely in line with the best private-sector plans. Major proposed changes included reducing the credit for service in the benefit formula; providing immediate, unreduced annuities only after the retiree's 62nd birthday; and integrating benefits with Social Security (21:35). The report argued that military retirement is prohibitively expensive and asserted that other personnel management policies could be modified to provide adequate incentives for retention.

Even as the PPSSCC was examining the military retirement system, an internal DoD analysis was being conducted by the Fifth Quadrennial Review of Military Compensation (QRMC V). This Congressionally-mandated review was charged by the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) with paying special attention to the level and structure of special and incentive pays and to the military estate program (27:I-1). QRMC V made its report to the Secretary of Defense in January 1984. It began by addressing the question of the military services' requirements for personnel. Requirements are best expressed in terms of the force profile, the distribution of officer and enlisted members by pay grade and length of service. The actual force profile in existence at any time usually differs from the services' objectives. The objectives, in turn, change over time in response to changing missions, increases or decreases in end strength, and weapons technology. QRMC V found that the services' force profile objectives generally paralleled the average of the force profiles during the seven year time span (1976-1982) (27:IV-29).

QRMC V then asked what the effect would be on the actual profiles and the objectives if the current system was replaced by a different one. More specifically, the study tried to determine whether there was an alternative retirement system that could provide the same retention incentives and thus produce a military adequate force profile while reducing cost.

QRMC V concluded that such an alternative could be found, but that it did not have many of the characteristics of the proposals of earlier studies. In particular, by requiring that the incentives for retention under any new system match those of the current system, QRMC V ruled out reducing the value of military retirement for members

who retire after 20 or more years of service. Equally important, it proscribed any increase in the value of benefits for those who fail to complete 20 years (27:IV-35).

The latter restriction ruled out early vesting or deferred annuities for members separating before 20 years of service, even though all previous studies had recommended such additional benefits. The former limitation required that any reduction of retirees' annuities be matched by provision of an equally valuable benefit. QRMC V recommended that retirees who complete 20 or more years of service receive smaller annuities than under the present system, and that the annuities of those under age 62 be only partially protected against inflation (three-quarters rather than full COLA) (27:IV-35). To offset the reduction in the value of the retirement system brought about by these changes, QRMC V proposed to pay a portion of the reduced lifetime benefit at the time of retirement. This approach was designed to capitalize on the difference between an individual's high rates of preference for current income and the federal government's lower rate of time preference based on government interest rates. According to QRMC V, these changes in combination would maintain the same retention incentives as the present military retirement system, but at significantly reduced cost.

In a 1998 research report conducted by RAND's National Defense Research Institute and sponsored by the Office of the Secretary of Defense, a theoretical and empirical model was developed to analyze the effects of converting the current military retirement system to an alternative system modeled after the Federal Employee Retirement System (FERS). The alternative system consisted of three parts. The first was a retirement plan that is very similar to FERS, which they call the Military Federal Employee Retirement System (MFERS). The second part was a seven percent across-

the-board pay increase to compensate members for mandatory contributions to the retirement plan. The third part was a set of retention bonuses targeted to specific groups to address any retention problems (15:xi).

Similar to FERS, MFERS would consist of three parts: Social Security benefits, a defined benefit plan (called the basic plan) that vests employees in an old-age annuity at five years of service, and a defined contribution plan (TSP) that vests employees at three years of service and matches employee contributions up to five percent of basic pay.

The study compared the REDUX system and the proposed alternative, MFERS. For MFERS to represent an unambiguous improvement over REDUX, it must reduce costs at the same time it maintains force structure. Costs are composed of active duty pay plus an accrual charge to fund future retirement liabilities of the current force. A critical element in costing is the real discount rate used to determine the military retirement accrual charge. The real discount rate is an important determinant of the cost of the military retirement system, or the savings from changing it. An increase in the real discount rate reduces the accrual charge for the current force and tends to reduce the savings to be had from implementing policy changes that reduce future retirement outlays. Until very recently, the DoD Actuary used a two percent real rate in estimating the accrual charge. Beginning in FY 1995, the Actuary raised its real discount rate assumption to 2.75 percent (15:xiii).

Since the determination of what the real discount rate should be for public decisions is an inexact science, the RAND study accounted for the uncertainty in real discount rates by evaluating the costs for MFERS assuming various real discount rates. The study found that when two percent was used to calculate the accrual costs, MFERS

with a pay raise would reduce total manpower costs by about six percent and result in annual savings to the DoD of about $2.4 billion based on FY 1997 force levels. At this discount rate, MFERS appeared to be a clear improvement over REDUX. However, the case for MFERS was less compelling when higher real discount rates were applied to the model. At 2.75 percent, the savings in total manpower costs declined to 2.2 percent (about $1 billion for the 1997 force level). When the discount rate was raised to five percent, MFERS was estimated to cost six percent more than REDUX (15:xiv).

Despite the influences and recommendations of the many studies of military retirement, the system has remained fundamentally unchanged since 1948. The majority of studies has been narrowly focused either on cost reduction, force management, or fairness and has seemingly ignored other possibilities for accomplishing the military's retirement objectives while meeting all of these goals.

2.6 Summary

Although the growth of private pension plans has roughly coincided with that of military retirement, significant differences exist in structure. There has been a variety of private plans in existence, but in recent times only one military plan as specified by law has governed all military pensions.

One major difference is in the area of financing. Private pensions are financed by joint contributions of the employee and employer or solely by the employer due to tax advantages. The military retirement system is completely financed by the American taxpayer.

Although no age is specified for military retirement, the completion of 20 years of service is required to qualify for a pension. This provision of military retirement has also been a source of criticism since it enables most military personnel to retire and immediately begin receiving pension checks before reaching the age of 45. Therefore, military personnel can be on a pension financed by tax revenues for 20 or more years longer than civilian contemporaries, who usually cannot retire and begin drawing a pension before reaching the normal retirement age of 65.

Another difference between military and private plans is in vesting requirements. Full vesting occurs no later than upon the completion of 10-15 years of service for private plans. Those in the military must complete 20 years of service to be vested. Although the longer vesting period required by the military plan may increase personnel retention, it is the main shortcoming of the military retirement system in comparison with plans available to the general public and a recurring source of criticism.

The 20 year requirement for the vesting of military retirement benefits also inhibits the mobility of military personnel, especially those who have served over half of the time necessary to qualify for a pension. Private plans also inhibit worker mobility, but it is important to note that some pension plans were established to improve employee retention, which necessarily inhibits mobility. On the other hand, most private plans in the economy are somewhat portable because employees have contributed portions of their pay for their future retirement.

A basic philosophy of private and military pensions is that a lower wage is accepted during working years in return for deferred wages in the form of a retirement pension. Private plans have used this idea to increase total employee compensation

through a pension plan when wage increases were limited or forbidden by the government. The availability of deferred wages in the form of a pension has been an excuse for traditionally low wages in the military.

It can be concluded from information presented in this Chapter that the military retirement plan is considerably more generous than most private plans although it falls short in its vesting provision. Much concern over the increasing cost of military retirement in recent years has been evident. Also, it has been concluded by some groups that the military retirement system is inconsistent with defense manpower needs due to the career patterns it encourages. As a result, several alternate retirement systems for military personnel have been proposed. The study groups that have proposed changes to the military retirement system have focused attention on its generosity and rising costs. Increasing public and Congressional concern over military pension costs make reform inevitable.

Although the Congress has refrained to this point from making structural changes in military retirement, continuing pressure to reduce the cost of the system may ultimately spur consideration of fundamental reform. In addition, the cost-containment measures enacted during the past few years may eventually induce the Department of Defense to support modification of military retirement to improve retention. This Chapter's review of recent studies suggests that a near consensus exists that some type of contributory and vesting principles should be embodied in a modified military retirement system.

3. Methodology

3.1 *Introduction*

History has shown that the Military Retirement System (MRS) has been subjected to numerous changes. Some of these changes have increased benefits, while others have decreased benefits. Current political leaders are considering benefit reductions to reduce the overall cost to the government for military retirement benefits. However, these proposed cuts include cost reductions within the guidelines of the current MRS. This chapter describes system restructuring as an alternative approach to cutting costs.

The system restructuring is based on the development of a retirement system for the DoD that maintains, if not enhances, the manpower control aspects of the current retirement system but can be implemented at a substantially reduced cost to the taxpayer. As was discussed earlier in this research, the cost of the current system is the main reason it has received so much attention in recent years. It follows from this concept then that a system that can accomplish the same or provide enhanced benefits for a reduced cost would be in the best interests of both the DoD and service members. Any time the retirement system is debated or changed by Congress there is an immediate and apparent effect on service members' morale and subsequently the services' accession and retention abilities. Another aspect of the system that must be considered is the detrimental effect that the lower benefit level afforded by the adoption of the REDUX plan had on manpower control and retention. Consideration must also be given to adopting a plan

that is comparable to what is commonly accepted by the majority of society. The existing defined benefit plan, based solely on years of service and highest 36-months of base pay which vests members only after 20-years of service, is neither consistent with nor easily comparable to most civilian employee retirement plans. The movement of most civilian industry to defined contribution-type retirement plans that are flexible and portable signals the need for the DoD to follow suit if it wants to stay competitive for the most qualified future military entrants. Any retirement system that is to receive serious consideration for acceptance by the DoD must have several key elements. While low cost is important to the DoD for many reasons, the ability to maintain force structure and required end strength is not negotiable. The first, and probably most important, of these elements is that the benefits, as perceived by the service member, must be at least equal to or greater than those of the old system. If this is not the case, then there will be immediate detrimental effects on force structure and retention efforts as was experienced following the adoption of REDUX. A second element for consideration is the manpower control tools that are required by the objectives of the system. There is little argument that the existing "20 or nothing" concept, while outdated, is a large motivator and tool for mid-career service member retention. Consideration must also be given to how to entice members to leave the service voluntarily when their staying is no longer in the best interest of the military. Another key element of the system is its desirability to potential military entrants.

System restructuring would change the emphasis from cutting benefits to keeping costs constant (or lower) with an equal (or greater) benefit level. This restructuring approach is based on three options that have varied contribution percentages. Eligibility

for benefits of each option would be based on the number of years completed by the service member. If the service member separates from the service before the normal 20 year service point, then the money contributed by the member and the corresponding contribution by the government would be immediately available to the service member after separation from the service.

The measurement of costs is the basis of this research. Costs include the amount of money needed to pay for future retirement annuities. A model was developed to estimate the costs of the current system and to calculate the costs of the proposed systems. Once the costs were calculated for each system a comparison between each system was required. The cost comparison constitutes the heart of the research – if a proposed system is more economical than the current system, it deserves further study. Otherwise, a new system should be proposed. The comparison is the measure of effectiveness, in dollars, of a proposed system. A secondary measure of effectiveness pertains to the comparison of individual benefit levels between the proposed systems. As with costs, the benefit levels are measured in dollars. In other words, a benefit level refers to how much money an individual would receive if the service member was placed under one of the proposed systems.

A spreadsheet was chosen as the platform on which to build the model. The spreadsheet had to be able to "share" data between systems, calculate their respective costs and benefits, and permit comparison of outputs. Microsoft Excel® was chosen because of its availability, ease of use, and computing power.

Once the software was chosen, the model building could begin. The first objective was to determine the costs of the current system. The current system costs would include calculations for each of the

three current retirement plans. The model building process was iterative, and ultimately, the model evolved to that shown in

Figure 6.
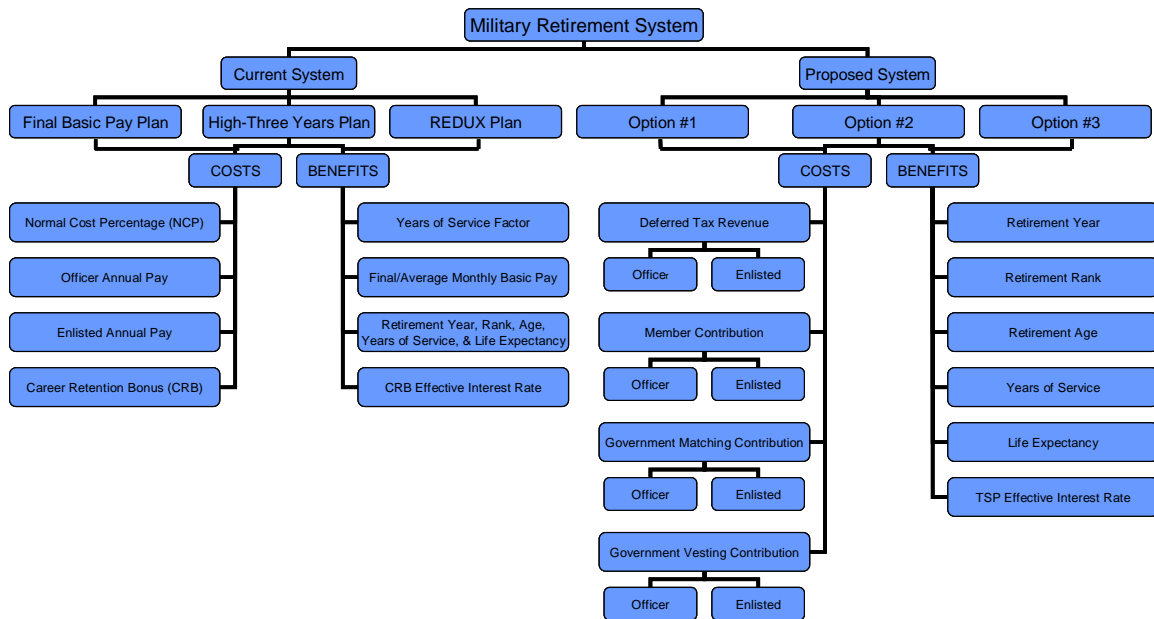
Figure 6: Thesis Model Overview

With the key elements discussed above taken into consideration the following retirement options are offered for consideration. The cost and benefit values presented in this chapter will be based on a deterministic-type model. In addition, a stochastic model of the benefits will be presented to allow for a more accurate comparison of the existing plans and the newly proposed plans. The following sections outline the proposed approach to the problem, the model description, and employment of the model. All

calculations are based on fiscal year 2001 DoD data and historical inflationary and TSP investment return data.

3.2 Deterministic Approach

The costs and benefits of any retirement system can be determined numerous ways. A relatively common and simple approach is the use of a deterministic type analysis. The basic idea behind this approach is to utilize existing historical data for model input. The results from a deterministic analysis are point estimates. In the case of the retirement system options, the costs and benefits can be found in this manner to allow for initial comparison of the three options that would be offered to future military entrants.

To analyze the costs and benefits associated with the various retirement system options some assumptions were made. To fully understand the output results from any model one must first understand the assumptions and limitations that went into the design of the model. The following list details the major assumptions made when calculating the current and alternative retirement plans costs and benefits.

1. The use of fiscal year 2001 data is representative of the DoD manpower force structure and average monthly basic pay. Detailed data can be reviewed in APPENDIX A: 2001 DoD Manpower Force Structure and Appendix B: 2001 DoD Average Monthly Basic Pay.

2. Cost-of-Living-Adjustments (COLAs) are not factored in the benefits of each retirement plan.

3. Historical annual base pay raises are included in the model and future annual base pay raises are set at 3.6%, which is the mode of historical basic pay increases from 1958 - 2001. Detailed data can be reviewed in Appendix C: Historical Military Basic Pay Scale Increases.

4. The average federal income tax rate for military personnel is assumed to be 16%.

5. The typical DoD career progression and corresponding pay rates are representative of the average officer and enlisted military member. Data for both officer and enlisted members can be reviewed in Appendix D: Typical DoD Career Progression & Corresponding Pay Rate (1971 – 2001).

6. The typical enlistee enlists at age 20 and the typical officer receives a commission at age 23.

7. Life expectancies of retired military members that are not disabled are used to calculate retirement annuity values for each retirement plan. Detailed data can be reviewed in Appendix E: Nondisability Retired Life Expectancies.

8. The historical rates of return on the TSP funds and inflation rates are representative of what returns would be for each alternative retirement plan.

9. Return rates were not available for each fund from 1971 – 1980. The compound annual return from 1981 – 2001 for each fund was calculated and used for those years without return data. The real return for the years of 1971 – 1980 was determined by subtracting the compound annual return (1981 – 2001) from the average inflation rate from 1981 – 2001 (3.73%). These values can be found in Appendix F: Historical Returns for Thrift Savings Plan Funds and Appendix G: Historical Inflation Rates.

10. Necessary policy and statute changes would be enacted such that limitations including maximum contribution limits for TSP accounts would not be violated by each alternative retirement plan.

11. The number of personnel selecting each retirement plan is not accounted for because each plan is evaluated in terms of cost and benefits provided.

12. Money granted to a military member in the form of a CRB is invested in the TSP account and is not withdrawn during the military member's career. In addition, the CRB money is allocated in a manner similar to the allocations outlined in Table 2.

Table 2. TSP Asset Allocation.

FUND	COMPARABLE INDEX/SECURITY	PERCENT OF ASSETS
G	Short-term Government Securities	5%
F	Lehman Brothers U.S. Aggregate Index	40%
C	S&P 500 Index	30%
S	Wilshire 4500 Stock Index	10%
I	EAFE Index	15%
	TOTAL	100%

13. Assets invested in the TSP will be allocated in a manner similar to the allocations given in Table 2. The asset allocation is not changed during the military member's career and is representative of an investor with medium risk tolerance (21).

As was discussed in Chapter 2, the military retirement system currently consists of three different options: the Final Basic Pay Plan, the High-Three Years Plan, and the REDUX Plan. The deterministic cost and benefits of each of the current options and the three proposed alternatives used in developing the model are discussed in the next four sections.

3.3 Deterministic Costs of Current Retirement Plans

The cost of the Final Basic Pay Plan and High-Three Years Plan were determined by using data provided in the *DoD Valuation Report on the Military Retirement System* produced by the DoD Office of the Actuary. The report contains a Normal Cost Percentage (NCP) for both the Final Basic Pay Plan and the High-Three Years Plan. For the year 2001 the NCPs for the Final Basic Pay Plan and the High-Three Years Plan were 31.8% and 28.9%, respectively, for non-disability retirement payments (44:9). In addition, the report contains the number of DoD personnel by age and years of service and the average monthly basic pay for DoD personnel by age and years of service. These values can be viewed in APPENDIX A: 2001 DoD Manpower Force Structure and Appendix B: 2001 DoD Average Monthly Basic Pay. The cost of the Final Basic Pay Plan and the High-Three Years Plan were then found by multiplying their respective NCP by the total annual gross base pay.

There were two separate calculations required to determine the cost of the REDUX Plan. The first was similar to that calculated to find the cost of the Final Basic Pay Plan and the High-Three Years Plan. Again, the NCP has been calculated and published by the DoD. The normal cost of the REDUX system for year 2001 was 26.9% (44:9). The first portion of the cost of the REDUX Plan was then determined by multiplying the NCP by the total annual gross base pay. The second calculation undertaken to determine the total cost of the plan was the cost of the CRB. The current value of the CRB is $30,000. The second portion of the cost of the REDUX Plan was found by multiplying the number of personnel who were in their 15th year of service by the amount of the CRB. Table 3 outlines the total cost data for each of the current military retirement plans in 2001. It is important to note that the values presented in Table 3 do not match the actual expenditure in fiscal year 2001 for active duty retired pay, but provide a baseline for analysis in this research. The difference is due to the fact that the model uses actuarial tables that calculate average basic pay amounts based upon age and years of service of the military force structure.

Table 3. Cost of Current Military Retirement Plans.

TOTAL CURRENT RETIREMENT PLAN COSTS (2001)			
	Final Basic Pay Plan	**High-Three Years Plan**	**REDUX Plan**
Normal Cost Percentage	31.8%	28.9%	26.9%
Officer Annual Pay	$11,876,981,484	$11,876,981,484	$11,876,981,484
Enlisted Annual Pay	$26,797,235,856	$26,797,235,856	$26,797,235,856
TOTAL PAY	$38,674,217,340	$38,674,217,340	$38,674,217,340
Career Retention Bonus (CRB)	N/A	N/A	$30,000
Number of Personnel Receiving Bonus			
Officer	N/A	N/A	9,442
Enlisted	N/A	N/A	33,764
TOTAL PERSONNEL	N/A	N/A	43,206
TOTAL CRB COSTS	N/A	N/A	$1,296,180,000.00
TOTAL SYSTEM COSTS	$12,298,401,114	$11,176,848,811	$11,699,544,464
Equivalent Normal Cost Percentage	Same as above	Same as above	29.3%

3.4   Deterministic Costs of Alternative Retirement Plans

The three alternatives for the military retirement system evaluated in this research can all be classified as defined contribution plans. Each option consists of three basic money streams that will increase as base pay and years of service increase. The three sources of money are: 1.) a percentage of base pay mandatory member contribution, 2.) a percentage of base pay government matching contribution, and 3.) a varying percentage of base pay government vesting contribution. The money will be invested in the military member's TSP account. The options presented offer varying incentives for extended careers. The funds in the member's TSP account would be made available to the member immediately upon separation from the service. If the member had served for less than 20 years, the funds would be portable or transferable to other retirement-type accounts, as is common in the civilian industry. If the member separates/retires from the service with at least 20 years of service, then the funds would be immediately available for withdrawal without penalty. Of course, this facet of each option requires a change in existing law to allow for penalty-free withdrawals from the account prior to reaching age 59½. Benefits such as commissary, exchange, and medical services would remain the same as under the current retirement system.

All military members participating in one of these options would be required to contribute a percentage of their base pay to the account for the duration of their time in service. As the TSP is a retirement investment vehicle, funds that are contributed are tax-deferred. For example, if the required contribution was 5% of base pay, the average military member pays federal income tax at a rate of approximately 16%, thus a member's take home pay would be lessened by only 4.2% on average (28:72). Any

funds contributed by the member are immediately vested. The government would match the percentage contribution of base pay that the member makes for the duration of the member's time in service. These funds would again vest immediately. The government vesting contribution portion of the retirement plans is based on the DoD valuation of continued member service. The rates presented in Appendix H: Alternative Retirement Plan Option #1, Appendix I: Alternative Retirement Plan Option #2, and Appendix J: Alternative Retirement Plan Option #3 show the percentages used for analysis of each option. The percentages are based on initial calculations of the plan providing equal or greater monetary value to the member retiring after 20 years of service versus the current military retirement system. They do not take into account the added value of the intangibles, such as portability, flexibility, and growth potential, which should be considered when making the final decision regarding vesting contribution percentages. The percentages of base pay that the vesting contributions account for will vest only after the member completes the associated year of service. Thus, any vesting contributions earned in a year of service automatically vests upon completion of the associated year of service.

Determining the total cost of the three proposed alternative options for the military retirement system requires finding the cost of the following: deferred tax revenue, member contributions, government matching contributions, and government vesting contributions. The cost of the deferred tax revenue is found by multiplying the associated percentage contribution of the total annual base pay applicable to the option by 16%. 16% is used here as it is assumed to be the average federal income tax rate of military personnel today. The government feels the costs of the deferred tax revenue;

therefore, it must be included as a cost in the analysis. Consequently, the member pays

for their contribution to the retirement fund in the proposed alternatives, unlike any of the

current military retirement plans. Therefore, this contribution must also be included in

the analysis. The member contribution cost is the associated percentage contribution of

the option multiplied by the applicable gross base pay for the year. DoD pays for the

government matching and vesting contributions costs. The government matching

contribution cost is simply the associated percentage contribution of the option multiplied

by the applicable gross base pay for the year. The third and final portion of the cost is

that of the government vesting contributions. The cost of the vesting contributions is

found by using typical DoD career progression data, corresponding pay rates, and

associated vesting contribution percentages. Table 4 reveals the costs of each alternative

military retirement plan.

Table 4. Costs of Alternative Military Retirement Plans.

TOTAL ALTERNATIVE RETIREMENT PLAN COSTS (2001)			
	Option #1	Option #2	Option #3
Deferred Tax Revenue			
Officer	$95,015,852	$57,009,511	$57,009,511
Enlisted	$214,377,887	$128,626,732	$128,626,732
TOTAL DEFERRED TAX REVENUE	$309,393,739	$185,636,243	$185,636,243
Member Contribution			
Officer	$593,849,074	$356,309,445	$356,309,445
Enlisted	$1,339,861,793	$803,917,076	$803,917,076
TOTAL MEMBER CONTRIBUTION	$1,933,710,867	$1,160,226,520	$1,160,226,520
Government Matching Contribution			
Officer	$593,849,074	$356,309,445	$356,309,445
Enlisted	$1,339,861,793	$803,917,076	$803,917,076
TOTAL GOVERNMENT MATCH	$1,933,710,867	$1,160,226,520	$1,160,226,520
Government Vesting Contribution			
Officer	$1,511,707,261	$1,078,656,192	$1,888,063,011
Enlisted	$2,761,747,112	$1,759,475,125	$3,124,414,743
TOTAL GOVERNMENT VEST	$4,273,454,373	$2,838,131,318	$5,012,477,754
TOTAL SYSTEM COSTS	**$8,450,269,846**	**$5,344,220,601**	**$7,518,567,038**
Equivalent Normal Cost Percentage	**21.8%**	**13.8%**	**19.4%**

3.5 Benefits of Current Military Retirement Plans

Now that the costs of each plan have been summarized, the benefits can be analyzed to provide each military member an idea of the value of each type of retirement plan. As was discussed earlier, there are currently three systems for computing the benefits of regular, nondisability military retirement pay. Each plan is dependent upon the member's date of initial entry into uniformed service and pays a lifetime annuity commencing immediately upon retirement to individuals who serve for at least 20 years. For comparison purposes in the deterministic analysis, 30 and 20 years of service members are displayed. An officer is assumed to receive a commission at an average age of 23 and an enlisted member is assumed to enlist at an average age of 20. Typical DoD career progression and corresponding monthly basic pay amounts from 1971 – 2002 were obtained to calculate the benefits afforded to each member (12). These values are displayed in Appendix D: Typical DoD Career Progression & Corresponding Pay Rate (1971 – 2001). Assuming an average age of entry for each scenario also allows the model to define the life expectancy of the military member. These values can be viewed in Appendix E: Nondisability Retired Life Expectancies.

Retiree entitlements under the Final Basic Pay Plan are based on the member's years of service at retirement and the basic pay amount in their last year of service. The percentage of basic pay that the retiree earns is dependent upon the number of years served. The percentage starts at 50% for 20 years of service completed and increases by 2.5% for each additional year until reaching a maximum of 75% at the 30 years of service point. The retiree's annuity is a perpetual type annuity in that payments are received for the remainder of the retiree's lifetime.

Retiree entitlements under the High-Three Years Plan differ slightly. The entitlement is based on the member's years of service at retirement and the average of the highest 36 months of base pay the member received. The percentage of average base pay that the retiree earns is dependent upon the number of years served. The percentage starts at 50% for 20 years of service completed and increases by 2.5% for each additional year until reaching a maximum of 75% at the 30 years of service point. The retiree's annuity under this plan is also a perpetual type annuity in that payments are received for the remainder of the retiree's lifetime.

The benefits afforded a retiree under the REDUX Plan consists of two money streams. The first money stream is a perpetual annuity similar in calculation to the High-Three Years Plan annuity. The value of the two annuities differs in the percentage of the average base pay. The annuity percentage factor starts at 40% for 20 years of service, vice the 50% used in the High-Three Years Plan calculation, and increases by 3.5% per year to again reach a maximum of 75% for 30 years of service. The second money stream is the value of the CRB. To find the maximum benefit value of the option, one assumes that the bonus is invested in the TSP and earmarked for use as retirement funds. To determine the value of the bonus at retirement age one needs to assume both a rate of return on the investment and rate of inflation for the years between receipt of the CRB and retirement. For the purposes of determining a point estimate of the value of CRB, the rate of return will be calculated using a specific asset allocation among the TSP funds. The asset allocation will be in accordance with the data given in the earlier assumptions, Table 2. Each year the rate of return was calculated using the corresponding return rate for the various funds in the TSP. The real value of the CRB was determined by

subtracting the return rate from the corresponding inflation rate. The annual return rate

data for a military member with 30 and 20 years of service can be reviewed in Appendix

K: Deterministic Career Retention Bonus Values. Table 5, Table 6, Table 7, and Table 8

contain the selected officer and enlisted retiree benefit calculations under the current

retirement plans. The assumptions for each calculation are described in each table.

Table 5. O-7 Retiring With 30 Years of Service in 2001 Under Current Retirement Plans.

CURRENT OFFICER RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR:	2001
RETIREMENT RANK:	O-7
RETIREMENT AGE:	53
YEARS OF SERVICE:	30
LIFE EXPECTANCY:	30.49
CRB EFFECTIVE INTEREST RATE:	8.53%
CRB ANNUITY FACTOR:	0.09293

FINAL BASIC PAY PLAN

Years of Service Factor	Final Monthly Basic Pay	Initial Annual Annuity
75%	$8,323	$74,903

HIGH-THREE YEARS PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
75%	$7,983	$71,843

REDUX PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
75%	$7,983	$71,843

Career Retention Bonus (CRB) Value	Annual Real Return Rate	CRB Annual Value
$148,845	8.21%	$13,832
	TOTAL (REDUX)	$85,675

Table 6. O-5 Retiring With 20 Years of Service in 2001 Under Current Retirement Plans.

CURRENT OFFICER RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR: 2001
RETIREMENT RANK: O-5
RETIREMENT AGE: 43
YEARS OF SERVICE: 20
LIFE EXPECTANCY: 40.92
CRB EFFECTIVE INTEREST RATE: 6.95%
CRB ANNUITY FACTOR: 0.07425

FINAL BASIC PAY PLAN

Years of Service Factor	Final Monthly Basic Pay	Initial Annual Annuity
50%	$5,790	$34,742

HIGH-THREE YEARS PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
50%	$5,438	$32,629

REDUX PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
40%	$5,438	$26,103

Career Retention Bonus (CRB) Value	Annual Real Return Rate	CRB Annual Value
$45,331	6.74%	$3,366
	TOTAL (REDUX)	$29,469

Table 7. E-9 Retiring With 30 Years of Service in 2001 Under Current Retirement Plans.

CURRENT ENLISTED RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR: 2001
RETIREMENT RANK: E-9
RETIREMENT AGE: 50
YEARS OF SERVICE: 30
LIFE EXPECTANCY: 29.81
CRB EFFECTIVE INTEREST RATE: 8.53%
CRB ANNUITY FACTOR: 0.09341

FINAL BASIC PAY PLAN

Years of Service Factor	Final Monthly Basic Pay	Initial Annual Annuity
75%	$4,061	$36,547

HIGH-THREE YEARS PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
75%	$3,888	$34,994

REDUX PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
75%	$3,888	$34,994

Career Retention Bonus (CRB) Value	Annual Real Return Rate	CRB Annual Value
$148,845	8.21%	$13,903
	TOTAL (REDUX)	$48,898

Table 8. E-8 Retiring With 20 Years of Service in 2001 Under Current Retirement Plans.

CURRENT ENLISTED RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR:	2001	
RETIREMENT RANK:	E-8	
RETIREMENT AGE:	40	
YEARS OF SERVICE:	20	
LIFE EXPECTANCY:	40.17	
CRB EFFECTIVE INTEREST RATE:	6.95%	
CRB ANNUITY FACTOR:	0.07451	

FINAL BASIC PAY PLAN

Years of Service Factor	Final Monthly Basic Pay	Initial Annual Annuity
50%	$3,138	$18,828

HIGH-THREE YEARS PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
50%	$2,929	$17,572

REDUX PLAN

Years of Service Factor	Average Last 36 Months Basic Pay	Initial Annual Annuity
40%	$2,929	$14,057

Career Retention Bonus (CRB) Value	Annual Real Return Rate	CRB Annual Value
$45,331	6.74%	$3,378
	TOTAL (REDUX)	$17,435

3.6 *Benefits of Alternative Military Retirement Plans*

The benefits from the alternative military retirement plans differ markedly from the three options discussed above. There is no guaranteed perpetual annuity portion with the alternative military retirement plans. The benefits afforded the retiree are simply the contributions that both the retiree and the government made during the member's uniformed service. To find the retiree's benefits one must calculate the value of the TSP contributions plus accumulated returns for the period that the individual served in the military. Again, the funds are invested in TSP accounts in an asset allocation similar to that assumed in defining the model (see Table 2). To find a point estimate of the final value one must again use historical rates of return for the given asset allocation. For the purpose of comparison, actual pay, inflation rates, and rates of return on like investments from 1971-2002 have been used to compute a retiree's benefits had the military member

been placed in one of the alternative military retirement plans upon entering the service.

Again, the annual return rate data for a military member with 30 and 20 years of service

can be reviewed in Appendix K: Deterministic Career Retention Bonus Values. Table 9,

Table 10, Table 11, and Table 12 contain the selected officer and enlisted retiree benefit

calculations under the alternative retirement plans. The assumptions for each calculation

are described in each table.

Table 9. O-7 Retiring With 30 Years of Service in 2001 Under Alternative Retirement Plans.

ALTERNATIVE OFFICER RETIREMENT PLANS BENEFIT COMPARISONS		
RETIREMENT YEAR:	2001	
RETIREMENT RANK:	O-7	
RETIREMENT AGE:	53	
YEARS OF SERVICE:	30	
LIFE EXPECTANCY:	30.49	
TSP EFFECTIVE INTEREST RATES:		
OPTION #1:	9.87%	
OPTION #2:	9.87%	
OPTION #3:	9.87%	
TSP ANNUITY FACTORS:		
OPTION #1:	0.10464	
OPTION #2:	0.10464	
OPTION #3:	0.10462	
	Option #1	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$1,527,754	9.45%	$159,859
	Option #2	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$1,029,020	9.45%	$107,679
	Option #3	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$1,476,401	9.45%	$154,460

Table 10. O-5 Retiring With 20 Years of Service in 2001 Under Alternative Retirement Plans.

ALTERNATIVE OFFICER RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR:	2001
RETIREMENT RANK:	O-5
RETIREMENT AGE:	43
YEARS OF SERVICE:	20
LIFE EXPECTANCY:	40.92
TSP EFFECTIVE INTEREST RATES:	
OPTION #1:	10.45%
OPTION #2:	10.45%
OPTION #3:	10.46%
TSP ANNUITY FACTORS:	
OPTION #1:	0.10629
OPTION #2:	0.10629
OPTION #3:	0.10641

Option #1

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$507,216	9.98%	$53,913

Option #2

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$304,330	9.98%	$32,348

Option #3

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$427,253	9.99%	$45,462

Table 11. E-9 Retiring With 30 Years of Service in 2001 Under Alternative Retirement Plans.

ALTERNATIVE ENLISTED RETIREMENT PLANS BENEFIT COMPARISONS

RETIREMENT YEAR:	2001
RETIREMENT RANK:	E-9
RETIREMENT AGE:	50
YEARS OF SERVICE:	30
LIFE EXPECTANCY:	29.81
TSP EFFECTIVE INTEREST RATES:	
OPTION #1:	9.87%
OPTION #2:	9.87%
OPTION #3:	9.87%
TSP ANNUITY FACTORS:	
OPTION #1:	0.10506
OPTION #2:	0.10506
OPTION #3:	0.10504

Option #1

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$788,898	9.45%	$82,882

Option #2

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$532,161	9.45%	$55,908

Option #3

TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$765,416	9.45%	$80,398

Table 12. E-8 Retiring With 20 Years of Service in 2001 Under Alternative Retirement Plans.

ALTERNATIVE ENLISTED RETIREMENT PLANS BENEFIT COMPARISONS		
RETIREMENT YEAR:	2001	
RETIREMENT RANK:	E-8	
RETIREMENT AGE:	40	
YEARS OF SERVICE:	20	
LIFE EXPECTANCY:	40.17	
TSP EFFECTIVE INTEREST RATES:		
OPTION #1:	10.44%	
OPTION #2:	10.44%	
OPTION #3:	10.46%	
TSP ANNUITY FACTORS:		
OPTION #1:	0.10640	
OPTION #2:	0.10640	
OPTION #3:	0.10653	
	Option #1	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$261,815	9.97%	$27,858
	Option #2	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$157,089	9.97%	$16,715
	Option #3	
TSP Lump Sum Real Value	Annual Real Return Rate	Initial Annual Annuity
$220,463	9.99%	$23,485

3.7   Stochastic Process

The model developed in this Chapter had several objectives. First and foremost of these objectives was to be a useful tool for the DoD when considering the costs and benefits of adapting an alternative retirement system. Secondly, the model was to be of use to any prospective military entrant in evaluating which retirement system option provided the most future value. Finally, the model was designed such that it is flexible enough to be easily modified for use in considering similar retirement system proposals. So, in order to fully understand the value of any proposed alternative to the military retirement system, one must be able to compare the future benefits of the current system to those of the alternative military retirement plan. To this end, the model was expanded using Monte Carlo simulation, which is a stochastic technique used to solve mathematical

problems. The word "stochastic" means that it uses random numbers and probability

statistics to obtain an answer. Monte Carlo methods randomly select values to create

scenarios of a problem (24). These values are taken from within a fixed range and

selected to fit a probability distribution. In Monte Carlo simulation, the random selection

process is repeated many times to create multiple scenarios. Each time a value is

randomly selected, it forms one possible scenario and solution to the problem. Together,

these scenarios give a range of possible solutions, some of which are more probable and

some less probable. When repeated for many scenarios (in this model 10,000), the

average solution will give an approximate answer to the problem.

Armed with these data vice a simple point estimate the model user can make a

better-informed decision and thus increase the chance of reaching the desired goal. As

previously stated, this type of simulation model lends itself to use in estimating the future

returns and subsequently the total value of a money stream. For this reason, it is

applicable to the analysis of the military retiree benefits afforded an individual under

either of the alternative retirement plans. The following sections explain how the model

was used to run simulations and derive estimated benefit data for the alternative military

retirement plans, along with their probability of occurrence. Data will be presented for

the year 2022 and 2032 projected retirement system member benefits.

3.8   *Stochastic Model Information and Assumptions*

The simulation portion of the model was created using the Crystal Ball simulation

software add-in to Microsoft Excel®, which is produced by Decisioneering®. The

Monte Carlo simulation portion of the model was utilized in order to achieve accurate

results of the future value of monies invested in the military member's TSP account and the future value of monies invested from the CRB. Thus, the simulation portion only affects the future benefit values of the alternative retirement plans and the CRB portion of the REDUX option. The simulation uses the data presented in Appendix F: Historical Returns for Thrift Savings Plan Funds and the data presented in Appendix G: Historical Inflation Rates to develop distributions for future returns. The model uses these distributions coupled with a random number generator to reach overall rate of return results. The simulated rates are more likely to reflect the true nature of the market than using a straight average, which was used in the deterministic approach. The output of this type of analysis is a range of values for the associated money stream and the overall probability of a given value being reached. This allows the user to determine the degree of certainty required of the alternative military retirement plans to forego the guaranteed annuity benefits of the current military retirement system plans.

To analyze the stochastic benefits associated with the various retirement system plans some assumptions had to be made. Again, the accuracy and usefulness of any model output is limited by the quality of the input data and underlying assumptions of the model. The assumptions outlined in Section 3.2 still apply to the stochastic portion of the model. In addition, it was assumed that the value of the Career Retention Bonus (CRB) (currently $30,000) would be increased by 10% every five years starting in the year 2005. So, the beginning value of the CRB for a future military member in the stochastic portion of the model would be $39,930.

The TSP funds were assumed to be independent. That is, no correlation was accounted for in the distributions of the annual TSP fund return rates. But, there were

numerous assumptions made regarding the actual distributions of inflation rates and TSP

fund interest rates. The details of these assumptions can be reviewed in Appendix L:

Simulation Report. The distribution assumptions were made using the "fit distribution"

function of the Crystal Ball software package. Because the data is continuous and there

were a relatively small number of data points for each variable, the Anderson-Darling (A-

D) statistic was used for the critical value. The distribution that had the best A-D statistic

was selected for each variable.   Table 13 contains an overview of the distribution

assumptions made in the stochastic portion of the model. An explanation of the

distributions used for the inflation rates and the TSP fund interest rates follows. The

results of the simulation are presented in the next Chapter.

Table 13. Stochastic Model Distribution Assumptions.

STOCHASTIC DISTRIBUTION ASSUMPTIONS	
VARIABLE	**DISTRIBUTION**
INFLATION RATES	**Gamma**
TSP G-FUND	**Gamma**
TSP F-Fund	**Logistic**
TSP C-Fund	**Triangular**
TSP S-Fund	**Triangular**
TSP I-Fund	**Logistic**

The distribution for the inflation rate was developed using the actual inflation rates

from 1971 – 2001 (Appendix G: Historical Inflation Rates). After using the Crystal Ball

"fit distribution" function, the gamma distribution was selected because it represented the

best fit for the inflation rate data.   Table 14 contains the parameters for the distribution

used to simulate the inflation rate for each year in the simulation (2002 – 2032). The

information in Table 14 represents the year 1971 because the way the model was

constructed, the year 1971 corresponds to the simulated year of 2002. The distributions

for each inflation rate in each simulated year (2002 – 2032) are the same as shown in
Table 14.

Table 14. Inflation Rate Distribution Parameters.

Gamma distribution with parameters:		
Location	1.45%	
Scale	2.62%	
Shape	1.379462572	
Selected range is from 1.45% to +Infinity		
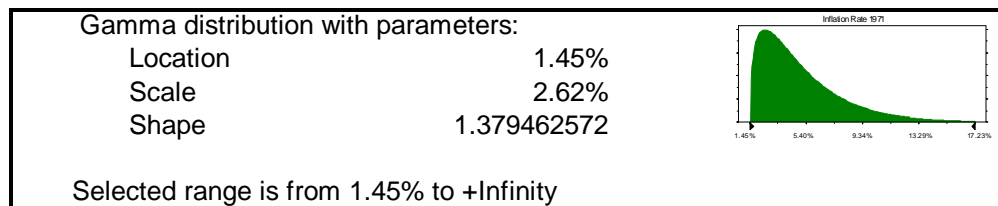
The distribution for the TSP G-Fund was developed using the actual fund rates of
return from 1981 – 2001 (Appendix F: Historical Returns for Thrift Savings Plan Funds).
After using the Crystal Ball "fit distribution" function, the gamma distribution was
selected because it represented the best fit for the TSP G-Fund rate of return data.   Table
15 contains the parameters for the distribution used to simulate the TSP G-Fund rate of
return for each year in the simulation (2002 – 2032). The information in Table 15
represents the year 1971 because the way the model was constructed, the year 1971
corresponds to the simulated year of 2002. The distributions for each TSP G-Fund rate of
return in each simulated year (2002 – 2032) are the same as shown in Table 15.

Table 15. G-Fund Distribution Parameters.

Gamma distribution with parameters:		
Location	5.27%	
Scale	2.44%	
Shape	1.380686149	
Selected range is from 5.27% to +Infinity		

The distribution for the TSP F-Fund was developed using the actual fund rates of
return from 1981 – 2001 (Appendix F: Historical Returns for Thrift Savings Plan Funds).
After using the Crystal Ball "fit distribution" function, the logistic distribution was

selected because it represented the best fit for the TSP F-Fund rate of return data.   Table

16 contains the parameters for the distribution used to simulate the TSP F-Fund rate of

return for each year in the simulation (2002 – 2032). The information in Table 16

represents the year 1971 because the way the model was constructed, the year 1971

corresponds to the simulated year of 2002. The distributions for each TSP F-Fund rate of

return in each simulated year (2002 – 2032) are the same as shown in Table 16.

Table 16. F-Fund Distribution Parameters.

Logistic distribution with parameters:		
Mean	10.22%	
Scale	4.22%	
Selected range is from -Infinity to +Infinity		

The distribution for the TSP C-Fund was developed using the actual fund rates of

return from 1981 – 2001 (Appendix F: Historical Returns for Thrift Savings Plan Funds).

After using the Crystal Ball "fit distribution" function, the triangular distribution was

selected because it represented the best fit for the TSP C-Fund rate of return data.   Table

17 contains the parameters for the distribution used to simulate the TSP C-Fund rate of

return for each year in the simulation (2002 – 2032). The information in Table 17

represents the year 1971 because the way the model was constructed, the year 1971

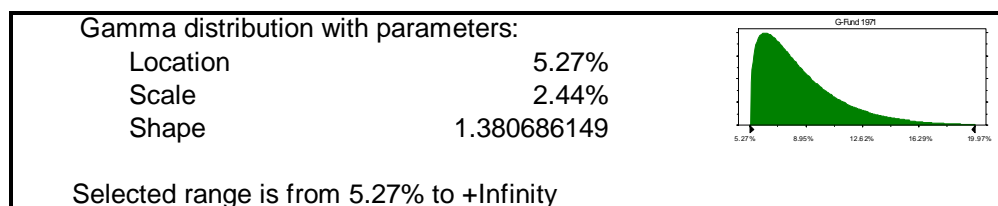corresponds to the simulated year of 2002. The distributions for each TSP C-Fund rate of

return in each simulated year (2002 – 2032) are the same as shown in Table 17.

Table 17. C-Fund Distribution Parameters.

Triangular distribution with parameters:		
Minimum	-23.65%	
Likeliest	31.69%	
Maximum	41.90%	
Selected range is from -23.65% to 41.90%		

The distribution for the TSP S-Fund was developed using the actual fund rates of return from 1981 – 2001 (Appendix F: Historical Returns for Thrift Savings Plan Funds). After using the Crystal Ball "fit distribution" function, the triangular distribution was selected because it represented the best fit for the TSP S-Fund rate of return data.   Table 18 contains the parameters for the distribution used to simulate the TSP S-Fund rate of return for each year in the simulation (2002 – 2032). The information in Table 18 represents the year 1971 because the way the model was constructed, the year 1971 corresponds to the simulated year of 2002. The distributions for each TSP S-Fund rate of return in each simulated year (2002 – 2032) are the same as shown in Table 18.
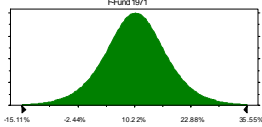
Table 18. S-Fund Distribution Parameters.

Triangular distribution with parameters:		
Minimum	-26.72%	
Likeliest	13.73%	
Maximum	54.44%	
Selected range is from -26.72% to 54.44%		

The distribution for the TSP I-Fund was developed using the actual fund rates of return from 1981 – 2001 (Appendix F: Historical Returns for Thrift Savings Plan Funds). After using the Crystal Ball "fi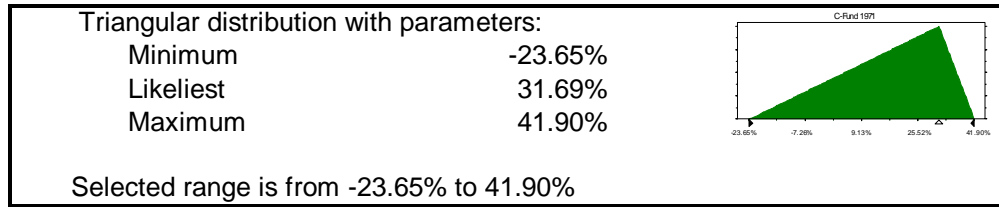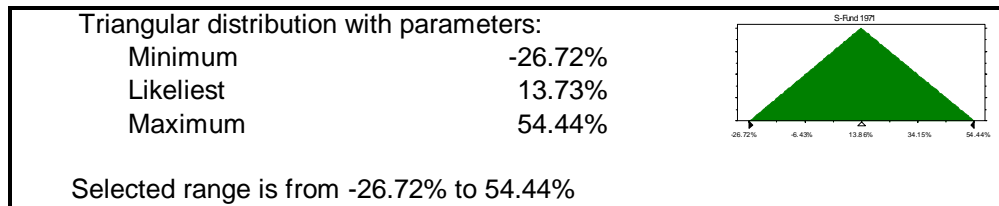t distribution" function, the logistic distribution was selected because it represented the best fit for the TSP I-Fund rate of return data.   Table

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19 contains the parameters for the distribution used to simulate the TSP I-Fund rate of

return for each year in the simulation (2002 – 2032). The information in Table 19

represents the year 1971 because the way the model was constructed, the year 1971

corresponds to the simulated year of 2002. The distributions for each TSP I-Fund rate of

return in each simulated year (2002 – 2032) are the same as shown in Table 19.

Table 19. I-Fund Distribution Parameters.

Logistic distribution with parameters:		
Mean	11.55%	
Scale	12.77%	
Selected range is from -Infinity to +Infinity		
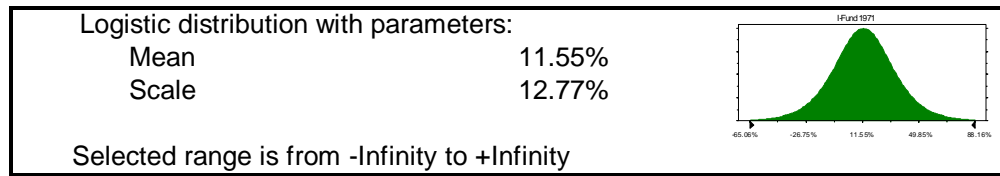
3.9 Summary

In conclusion, this chapter developed a methodology to determine the deterministic

and stochastic costs and benefits of the current and proposed alternatives to the military

retirement system. The methodology was based on system restructuring that would

change the emphasis from cutting benefits to keeping costs constant (or lower) with an

equal (or greater) benefit level. The results from both the deterministic and stochastic

portions of the model are presented in the next chapter.

4. Results

4.1 Overview

This chapter discusses the findings of the research described in Chapter 3. The deterministic and stochastic results were gathered by creating a spreadsheet model. For the deterministic portion, each alternative is discussed and compared to the current system. In addition, the stochastic portion of the model is outlined and compared to the current system.

The findings of this research are broken down into three groups: deterministic costs, deterministic benefits, and stochastic benefits. The cost is the total amount of 2001 dollars needed to fund a particular alternative for that year. The benefit dollar calculations are the amount of money an individual would receive for a particular alternative. Of course, the benefit dollars depend on the option (current, 1, 2, or 3). The cost and benefits afforded the military retiree under the current system and each of the three options is calculated using the same methodology as in Chapter 3. The difference in the deterministic and stochastic benefits portion of the model is that the rates of return on the TSP funds and the rates of inflation for future years are based on Monte Carlo simulation results rather than actual data or historical averages. This results in a more accurate estimation of the future value of the individual's retirement entitlements and gives the probability of the desired outcome or benefit level being reached. This allows the military member to make a better informed decision as to which option is best for

them and enables the DoD to make a better informed decision when establishing future incentive payment percentages and vesting period lengths.

4.2 Deterministic Cost Findings

The first piece of information needed was the cost of the current system and the proposed alternative plans. The cost of each retirement plan in 2001 dollars is outlined in Table 20. This is the annual baseline cost of each system. If an alternative system is to benefit the government and the taxpayer, the resulting cost must be less than the annual baseline cost of any of the current plans. Figure 7 and Figure 8 display bar graphs with the costs of each retirement plan and the normal cost percentages of each retirement plan.

Table 20. Total Retirement Plan Costs (2001).

TOTAL RETIREMENT PLAN COSTS (2001)		
	Total System Costs	Normal Cost Percentage (NCP)
Final Basic Pay Plan	$12,298,401,114	31.8%
High-Three Years Plan	$11,176,848,811	28.9%
REDUX Plan	$11,699,544,464	26.9%
Option #1	$8,450,269,846	21.8%
Option #2	$5,344,220,601	13.8%
Option #3	$7,518,567,038	19.4%

It is apparent from the graphs and Table 20 that Option #2 is the most economical, followed by Option #3 and Option #1, respectively. From a cost perspective, each of the proposed alternative retirement plans offer considerable cost savings to the government and the taxpayer. When compared to the Final Basic Pay Plan, Option #2 results in an annual savings of over $6.9 billion. When compared to the High-Three Years Plan and the REDUX Plan, Option #2 results in an annual savings of over $5.8 billion and $6.4

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billion, respectively. Obviously cost is not the only consideration when considering

changes to the military retirement system. This analysis demonstrates the cost savings

that could be realized by a change to the military retirement system.

Total Retirement Plan Costs (2001)
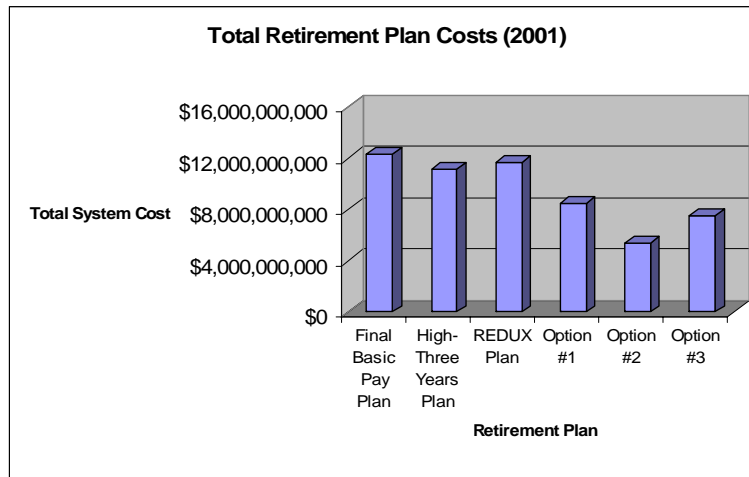
Figure 7. Military Retirement Plans Total System Costs.

Total Retirement Plan Costs (2001)
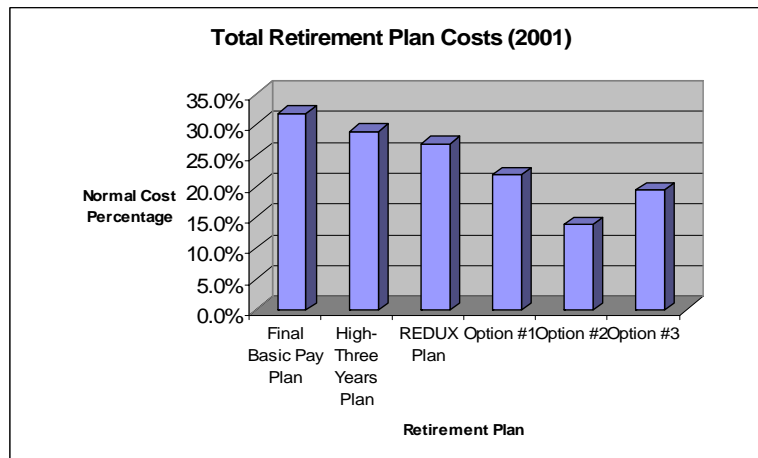
Figure 8. Military Retirement Plans Normal Cost Percentages.

4.3   Deterministic Benefit Findings

Clearly, any of the proposed alternative retirement plans cost less than any of the

current retirement plans. However, the value of any retirement system must also be

measured in terms of benefits provided to the military member. The model calculated the

value of the benefit dollars for the average officer and enlisted member of the military. Of course, members with more years or greater rank would receive more money, while members with less years or lower rank would receive less money. For comparison purposes, a nominal officer is commissioned at age 23 and after serving 20 or 30 years achieves the grade of O-5 or O-7, respectively. A nominal enlisted member enlists at age 20 and after serving 20 or 30 years achieves the grade of E-8 or E-9, respectively.

Table 21 outlines the benefit dollars afforded to a nominal officer serving 20 years in the military. Figure 9 displays a graphical comparison of the benefit dollars. Option #1 and #3 provide larger benefit annuities to the military member when compared to any of the current military retirement plans. Option #1 provides a benefit annuity of $53,913 and Option #3 is close with a benefit annuity of $45,462. Option #2, which was the least costly to the DoD, provides a benefit annuity comparable to any of the current retirement plans at $32,348. This makes sense because the individual military member and the government are both contributing less in this option compared to the other options (see Appendix I: Alternative Retirement Plan Option #2).

Table 21. Benefit Annuity Comparison for Nominal Officer Serving 20 Years Retiring in 2001.

NOMINAL OFFICER SERVING 20 YEARS & RETIRING IN 2001	
Retirement Plan	**Benefit Annuity**
FINAL BASIC PAY PLAN	$34,742
HIGH-THREE YEARS PLAN	$32,629
REDUX PLAN	$29,469
Option #1	$53,913
Option #2	$32,348
Option #3	$45,462
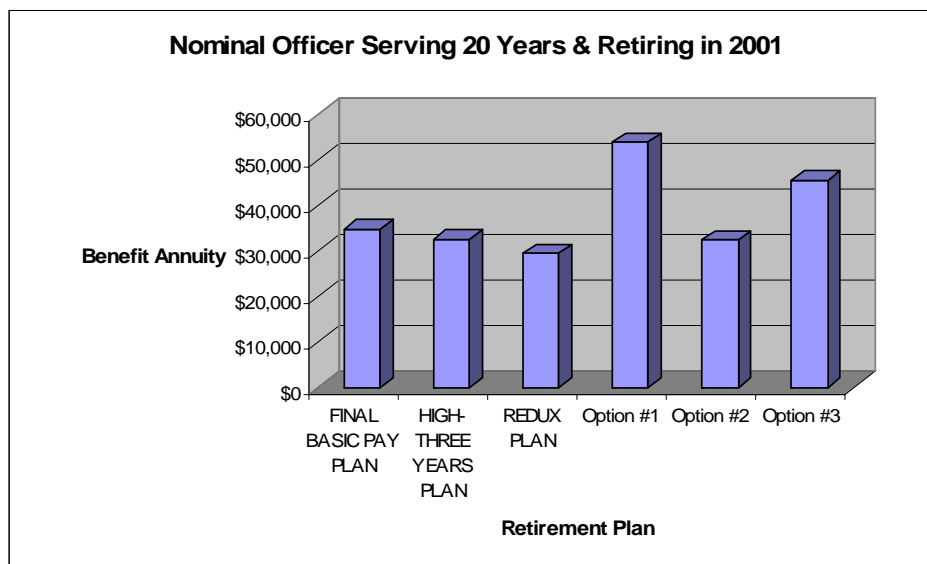
Figure 9. Benefit Annuity Graph for Nominal Officer Serving 20 Years Retiring in 2001.

Table 22 outlines the benefit dollars afforded to an average officer serving 30 years in the military. Figure 10 displays a graphical comparison of the benefit dollars. Option #1 and #3 provide the largest benefit annuities to the military member when compared to any of the current military retirement plans. Option #1 provides a benefit annuity of $159,859 and Option #3 is close with a benefit annuity of $154,460. Option #2, which was the least costly to the DoD, provides a benefit annuity slightly higher than any of the current retirement plans at $107,679. This slightly higher difference makes sense because the contributions of the individual military member and the government have 30 years to grow versus 20 years in the previous benefit comparison.

Table 22. Benefit Annuity Comparison for Nominal Officer Serving 30 Years Retiring in 2001.

NOMINAL OFFICER SERVING 30 YEARS & RETIRING IN 2001	
Retirement Plan	Benefit Annuity
FINAL BASIC PAY PLAN	$74,903
HIGH-THREE YEARS PLAN	$71,843
REDUX PLAN	$85,675
Option #1	$159,859
Option #2	$107,679
Option #3	$154,460
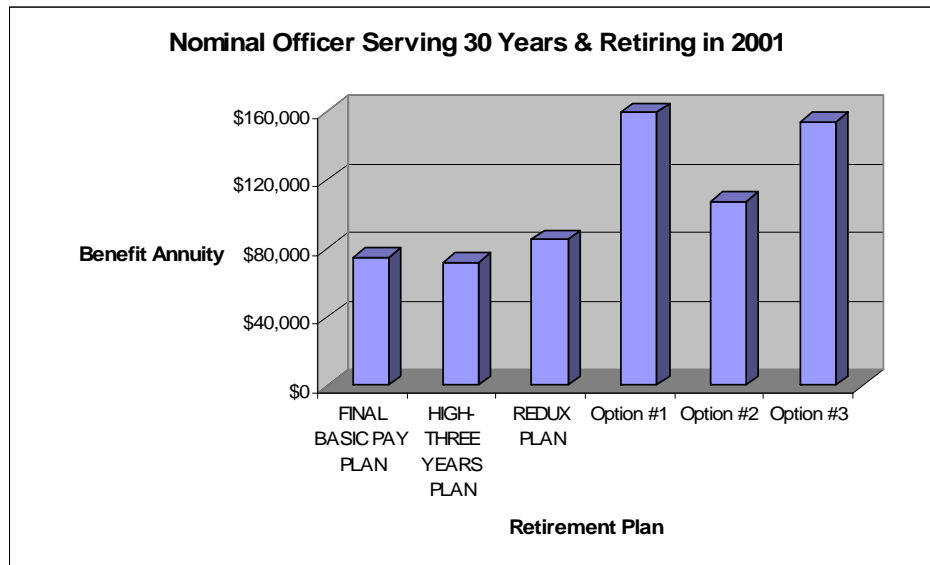
Figure 10. Benefit Annuity Graph for Nominal Officer Serving 30 Years Retiring in 2001.

Table 23 outlines the benefit dollars afforded to an average enlisted member serving 20 years in the military. Figure 11 displays a graphical comparison of the benefit dollars. Option #1 and #3 provide larger benefit annuities to the military member when compared to any of the current military retirement plans. Option #1 provides a benefit annuity of $27,858 and Option #3 is only slightly lower with a benefit annuity of $23,485. Option #2, which was the least costly to the DoD, provides a slightly lower benefit annuity compared to the current retirement plans at $16,715. Again, this makes sense because the individual military member and the government are both contributing

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less in this option compared to the other options (see Appendix I: Alternative Retirement Plan Option #2).

Table 23. Benefit Annuity Comparison for Nominal Enlisted Member Serving 20 Years Retiring in 2001.

| NOMINAL ENLISTED MEMBER SERVING 20 YEARS & RETIRING IN 2001	
Retirement Plan	Benefit Annuity
FINAL BASIC PAY PLAN	$18,828
HIGH-THREE YEARS PLAN	$17,572
REDUX PLAN	$17,435
Option #1	$27,858
Option #2	$16,715
Option #3	$23,485
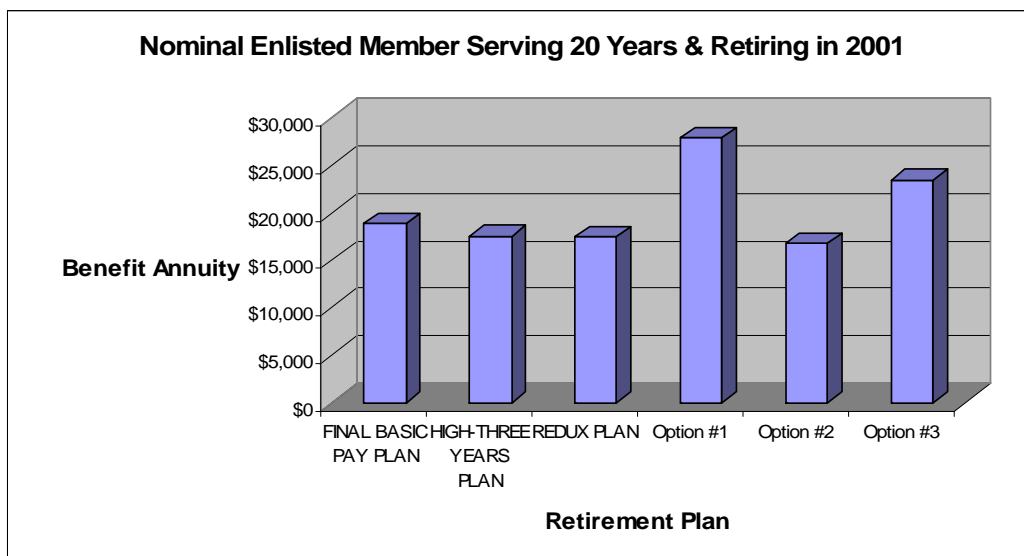
Figure 11. Benefit Annuity Graph for Nominal Enlisted Member Serving 20 Years Retiring in 2001.

Table 24 outlines the benefit dollars afforded to an average enlisted member serving 30 years in the military. Figure 12 displays a graphical comparison of the benefit dollars. Option #1 and #3 provide larger benefit annuities to the military member when compared to any of the current military retirement plans. Option #1 provides a benefit annuity of $82,882 and Option #3 is slightly lower with a benefit annuity of $80,398. Option #2, which was the least costly to the DoD, provides a considerably higher benefit

annuity compared to the Final Basic Pay Plan and High-Three Years Plan at $55,908.

But the benefit annuity provided by Option #2 is only slightly higher than the benefit

annuity provided by the REDUX plan of $48,898. Again, this makes sense because the

individual military member and the government are both contributing less in this option

compared to the other options (see Appendix I: Alternative Retirement Plan Option #2).

Table 24. Benefit Annuity Comparison for Nominal Enlisted Member Serving 30 Years Retiring in 2001.

NOMINAL ENLISTED MEMBER SERVING 30 YEARS & RETIRING IN 2001	
Retirement Plan	Benefit Annuity
FINAL BASIC PAY PLAN	$36,547
HIGH-THREE YEARS PLAN	$34,994
REDUX PLAN	$48,898
Option #1	$82,882
Option #2	$55,908
Option #3	$80,398
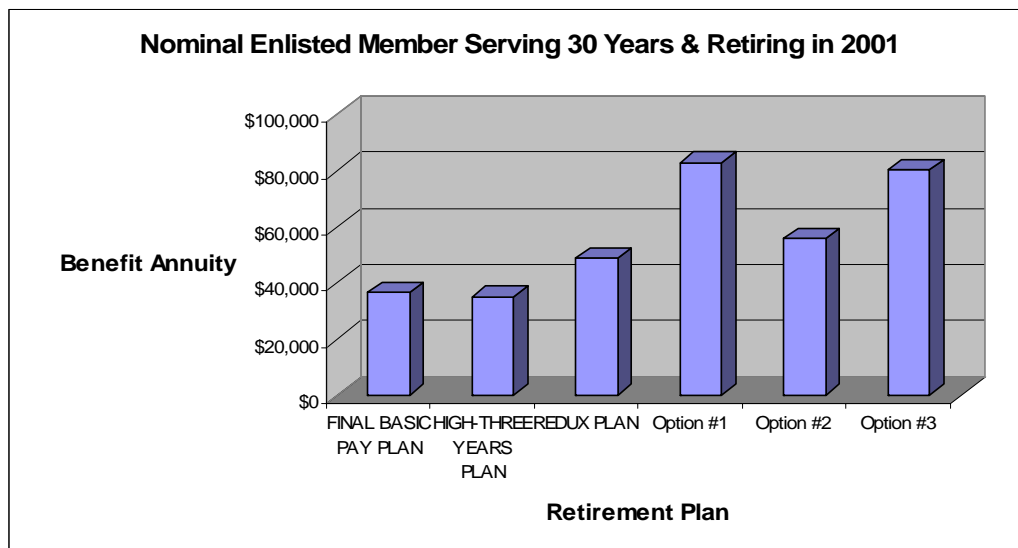
Figure 12. Benefit Annuity Graph for Nominal Enlisted Member Serving 30 Years Retiring in 2001.

4.4 Stochastic Benefit Findings

The strength of the stochastic portion of the model lies in its ability to predict the

future value of benefits afforded to a military member who is new to the military. The

model outlines the potential retirement benefit annuity values of each retirement plan in

this research. The value of the benefits of the proposed alternative military retirement

plans are compared to the benefits guaranteed to retiring service members under the

current military retirement system plans. For the REDUX plan and the proposed

alternative military retirement plans, the simulation results allow the military member to

compare the probability of attaining future monies equal to the Final Basic Pay and High-

Three Years plans. In both cases, the results also give the military member an idea of

what the probability of exceeding the Final Basic Pay plan and High-Three Years plan

annuity values and the potential magnitude of these additional benefits. The value that is

not shown in these calculations is that of choice. The REDUX plan and the proposed

alternative military retirement plans give the military member additional personal choices

that are not afforded members under the Final Basic Pay and High-Three Years plans.

This is especially true in each of the proposed alternative military retirement plans. Each

of the proposed alternative military retirement plans contain the added value of removing

the "20 or nothing" facet of the military retirement system, which may be of great value

to many prospective future military members. Each of the proposed alternative

retirement plans also have the benefit of allowing the military member the option of when

to withdraw their retirement assets. Currently, a retiree is paid an annuity commencing

immediately upon retirement regardless of whether the military member actually fully

retires or not. The proposed alternative military retirement plans would allow members

to go on to a second career if desired and still have all of their military retirement plan

dollars invested for use in later years. This could dramatically lower the tax burden

placed on the retirement funds when they are eventually withdrawn as well as allowing

for significant accumulation of additional assets.

How one interprets the results of the model output is subject to a person's acceptance of, or aversion to, risk. As was stated earlier, the model output is a range of potential results and the given probability of achieving any given level in the range. Many financial advisors recommend that a probability of less than 70% should be unacceptable when planning for one's retirement goals (30). Therefore, 30th percentile values will be used for comparison purposes because the 30th percentile represents a 70% probability of achieving a dollar amount equal to or greater than a military member's retirement planning goal. This study compares the current military retirement plans to the proposed alternative military retirement plans. In addition, the actual probability of achieving equal or greater annuities than those afforded the member by any of the current military retirement plans will be presented.

The results of running the model to analyze the benefits afforded a nominal officer retiring in the year 2022 with 20 years of service are similar to the deterministic benefits presented in section 4.3. Using the 30th percentile, Table 25 outlines the benefit dollars afforded to a nominal officer serving 20 years. Figure 13 displays a graphical comparison of the benefit dollars, again using the 30th percentile.

Table 25. Benefit Annuity Comparison for Nominal Officer Serving 20 Years Retiring in 2022.

NOMINAL OFFICER SERVING 20 YEARS & RETIRING IN 2022	
Retirement Plan	**Benefit Annuity**
FINAL BASIC PAY PLAN	$74,001
HIGH-THREE YEARS PLAN	$70,221
REDUX PLAN	$61,553
Option #1	$112,535
Option #2	$67,521
Option #3	$95,098

Figure 13. Benefit Annuity Graph for Nominal Officer Serving 20 Years Retiring in 2022.

The largest benefit annuities are provided by Option #1 and Option #3. Option #1 provides a benefit annuity of $112,535 and Option #3 provides a benefit annuity of $95,098. The benefit annuity value of Option #2 is the lowest amongst the proposed alternative military retirement plans, but the option provides a benefit annuity that is comparable to those of the current retirement plans at $67,521. The difference in the benefit annuity values is because each option contains varying contribution amounts. Furthermore, the value of the proposed alternative military retirement options is supported with an inspection of the simulated distributions of each option. Option #1 provides a benefit annuity greater than of the current military retirement plans at the 10th percentile. Option #2 provides a benefit annuity amount greater than any of the current military retirement plans at the 50th percentile. Finally, Option #3 provides a benefit annuity amount greater than any of the current military retirement plans at the 10th

percentile. Therefore, Option #1 and Option #3 each have a 90% probability of achieving annuity values greater than or equal to any of the current military retirement system plans. Option #2 has a 50% probability of achieving an annuity value greater than or equal to any of the current military retirement system plans, but this is far below the commonly accepted 70% threshold cut-off value. Thus, for this situation, a future military member would be unwise to select any of the current military retirement system plans or Option #2 if any of the proposed alternative plans were implemented.

The results of running the model to analyze the benefits afforded a nominal officer retiring in the year 2032 with 30 years of service are similar to the deterministic benefits presented in section 4.3. Using the 30th percentile, Table 26 outlines the benefit dollars afforded to an average officer serving 30 years in the military. Figure 14 displays a graphical comparison of the benefit dollars, again using the 30th percentile. Each of the proposed alternative military retirement plans provide greater benefit annuities to the military member when compared to any of the current military retirement plans. In fact, Option #1 and Option #3 of the proposed alternative military retirement plans provide benefit annuities over two times greater than those provided by the current military retirement system plans.

Table 26. Benefit Annuity Comparison for Nominal Officer Serving 30 Years Retiring in 2032.

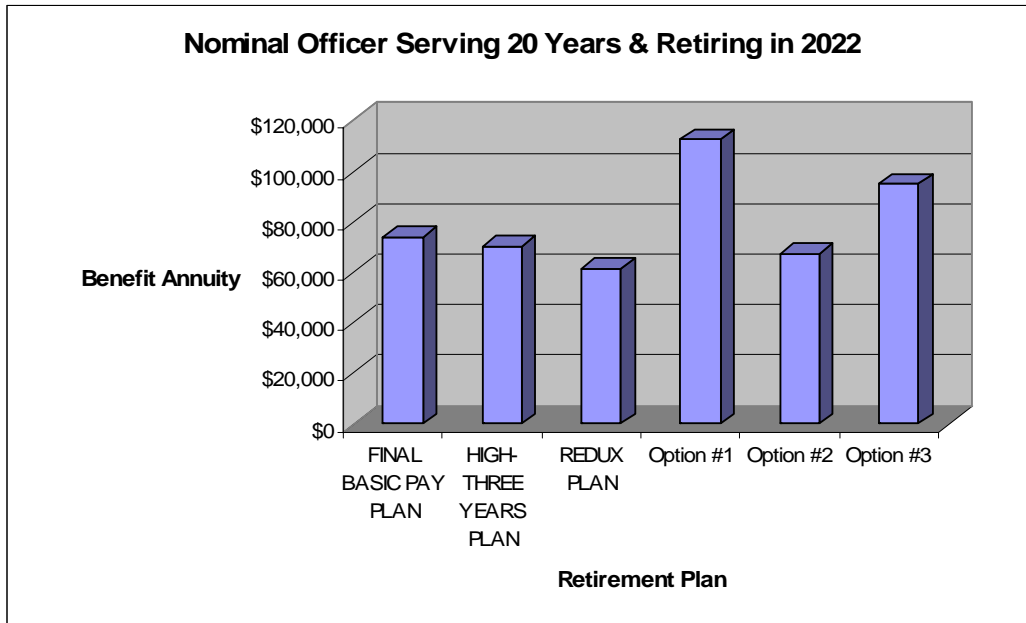| NOMINAL OFFICER SERVING 30 YEARS & RETIRING IN 2032	
Retirement Plan	Benefit Annuity
FINAL BASIC PAY PLAN	$227,239
HIGH-THREE YEARS PLAN	$219,434
REDUX PLAN	$241,588
Option #1	$569,302
Option #2	$383,071
Option #3	$544,028
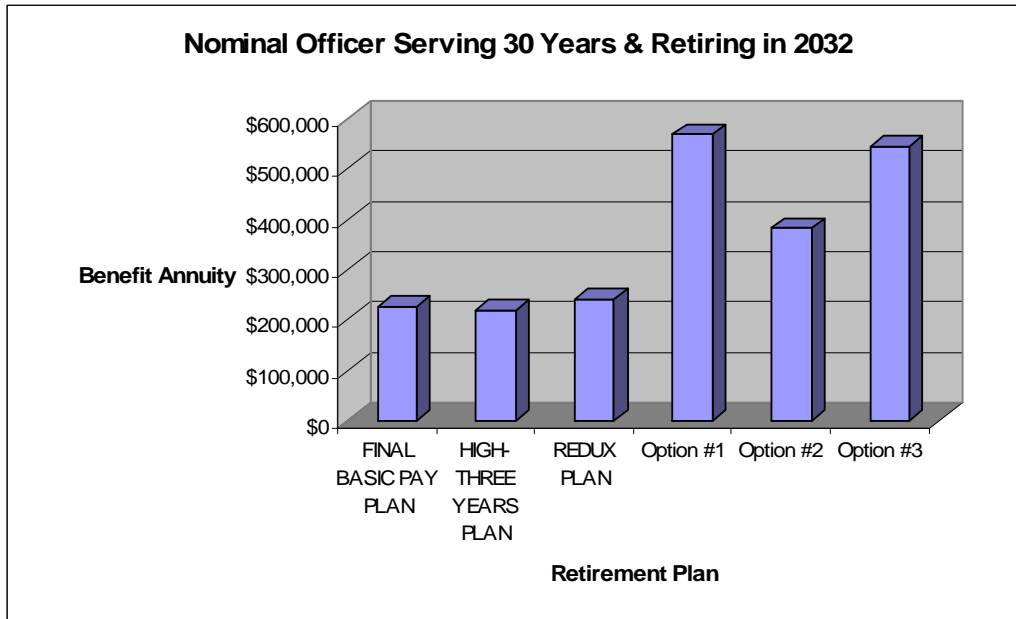
Figure 14. Benefit Annuity Graph for Nominal Officer Serving 30 Years Retiring in 2032.

Again, the largest benefit annuities are provided by Option #1 and Option #3. Option #1 provides a benefit annuity of $569,302 and Option #3 provides a benefit annuity of $544,028. Although the benefit annuity value of Option #2 is the lowest amongst the proposed alternative military retirement plans, the option provides a benefit annuity that exceeds those of the current retirement plans at $383,071. The difference in the benefit annuity values is because each option contains varying contribution amounts. Furthermore, the value of each of the proposed alternative military retirement options is supported with an inspection of the simulated distributions of each option. Each option provides a benefit annuity amount greater than or equal to any of the current military retirement plans at the 10th percentile. Therefore, each option has a 90% probability of achieving an annuity value greater than or equal to any of the current military retirement system plans. Thus, for this situation, a future military member would be unwise to

select any of the current military retirement system plans if any of the proposed alternative plans were implemented.

The results of running the model to analyze the benefits afforded a nominal enlisted member retiring in the year 2022 with 20 years of service are similar to the deterministic benefits presented in section 4.3. Using the 30th percentile, Table 27 outlines the benefit dollars afforded to a nominal enlisted member serving 20 years in the military. Figure 15 displays a graphical comparison of the benefit dollars, again using the 30th percentile. In the stochastic portion of the model, the largest benefit annuities are provided by Option #1 and Option #3. Option #1 provides a benefit annuity of $59,460 and Option #3 provides a benefit annuity of $50,334.

Table 27. Benefit Annuity Comparison for Nominal Enlisted Member Serving 20 Years Retiring in 2022.

NOMINAL ENLISTED MEMBER SERVING 20 YEARS & RETIRING IN 2022	
Retirement Plan	**Benefit Annuity**
FINAL BASIC PAY PLAN	**$41,630**
HIGH-THREE YEARS PLAN	**$39,388**
REDUX PLAN	**$36,902**
Option #1	**$59,460**
Option #2	**$35,676**
Option #3	**$50,334**

Figure 15. Benefit Annuity Graph for Nominal Enlisted Member Serving 20 Years Retiring in 2022.

In this case, the benefit annuity value of Option #2 is the lowest amongst the

current and proposed alternative military retirement plans at $35,676. The difference in

the benefit annuity values is because each option contains varying contribution amounts.

Furthermore, the value of the proposed alternative military retirement options is

supported with an inspection of the simulated distributions of each option.   Option #1

provides a benefit annuity greater than of the current military retirement plans at the 10th

percentile. Option #2 provides a benefit annuity amount greater than any of the current

military retirement plans at the 60th percentile. Finally, Option #3 provides a benefit

annuity amount greater than any of the current military retirement plans at the 10th

percentile. Therefore, Option #1 and Option #3 each have a 90% probability of achieving

annuity values greater than or equal to any of the current military retirement system

plans. Option #2 has a 40% probability of achieving an annuity value greater than or

equal to any of the current military retirement system plans, but this is far below the

commonly accepted 70% threshold cut-off value. Thus, for this situation, a future

military member would be unwise to select any of the current military retirement system

plans or Option #2 if any of the proposed alternative plans were implemented.

The results of running the model to analyze the benefits afforded a nominal enlisted

member retiring in the year 2032 with 30 years of service are similar to the deterministic

benefits presented section 4.3. Using the 30th percentile, Table 28 outlines the benefit

dollars afforded to a nominal enlisted member serving 30 years in the military. Figure 16

displays a graphical comparison of the benefit dollars, again using the 30th percentile.

Each of the proposed alternative military retirement plans provide extremely greater

benefit annuities to the military member when compared to any of the current military

retirement plans. In fact, Option #1 and Option #3 of the proposed alternative military

retirement plans provide benefits that are over two times greater than those provided by

the current military retirement system.

Table 28. Benefit Annuity Comparison for Nominal Enlisted Member Serving 30 Years Retiring in 2032.

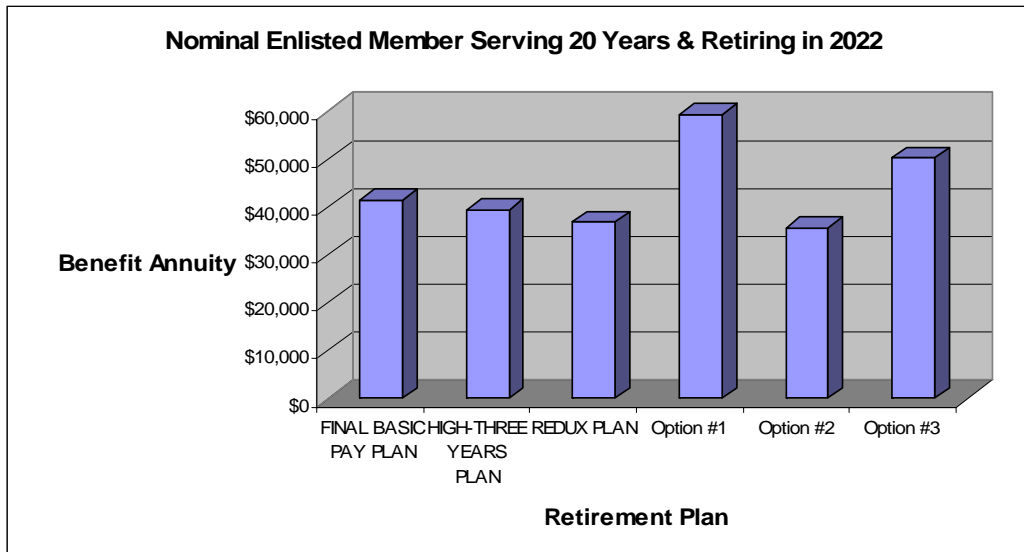| NOMINAL ENLISTED MEMBER SERVING 30 YEARS & RETIRING IN 2032	
Retirement Plan	**Benefit Annuity**
FINAL BASIC PAY PLAN	**$116,159**
HIGH-THREE YEARS PLAN	**$112,169**
REDUX PLAN	**$134,444**
Option #1	**$305,236**
Option #2	**$206,088**
Option #3	**$293,609**
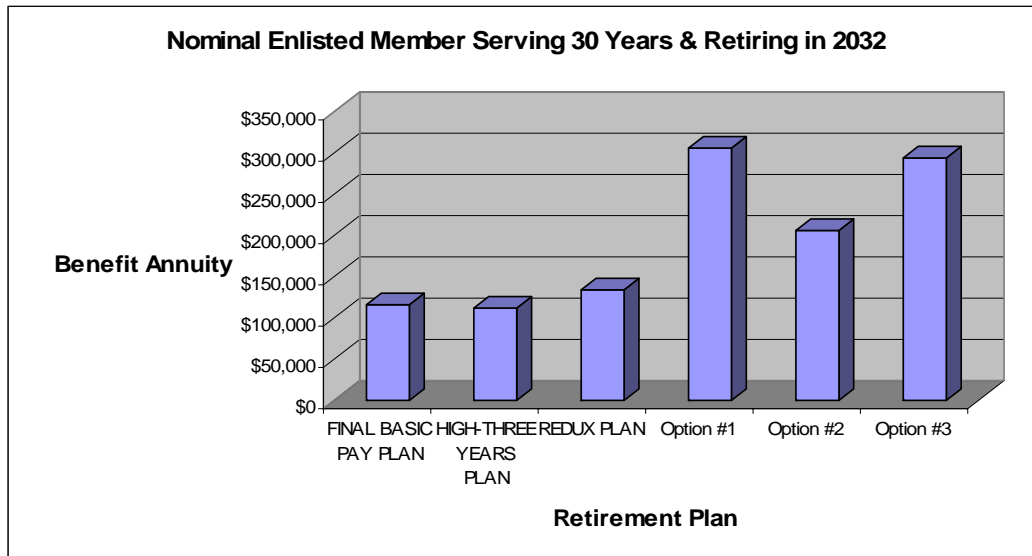
Figure 16. Benefit Annuity Graph for Nominal Enlisted Member Serving 20 Years Retiring in 2032.

Again, the largest benefit annuities are provided by Option #1 and Option #3.

Option #1 provides a benefit annuity of $305,236 and Option #3 provides a benefit

annuity of $293,609. Although the benefit annuity value of Option #2 is the lowest

amongst the proposed alternative military retirement plans, the option provides a benefit

annuity that exceeds those of the current retirement plans at $206,088. The difference in

the benefit annuity values is because each option contains varying contribution amounts.

Furthermore, the value of each of the proposed alternative military retirement options is

supported with an inspection of the simulated distributions of each option. Each option

provides a benefit annuity amount greater than or equal to any of the current military

retirement plans at the 10th percentile. Therefore, each option has a 90% probability of

achieving an annuity value greater than or equal to any of the current military retirement

system plans. Thus, for this situation, a future military member would be unwise to

select any of the current military retirement system plans if any of the proposed alternative plans were implemented.

4.5 Summary

The proposed alternative military retirement plans have many positive traits. The improvements over the existing program range from greater manpower control and lower cost from the prospective of the DoD to enhanced flexibility, portability, and comparability on the part of the military member. The alternative plan Option #1, which contains the most generous incentive contribution percentages, reduces the estimated current military retirement system costs by at least 27%. This amounts to a savings of an estimated of over $3.2 billion. The flexibility, portability, and comparability aspects of the system coupled with the fact that the proposed alternative options eliminates the "20 or nothing" facet of the current system make each of the proposed alternative military retirement plans much more appealing to today's potential military entrants. This should aid the military services in attaining accession goals. These traits make the system a suitable retirement system for consideration by the DoD.

5. Conclusions and Recommendations

5.1 Overview

This chapter discusses the conclusions of the research and gives recommendations for improving the model, plus ideas for further research. The conclusions are made using the results presented in Chapter 4. The recommendations were produced from knowledge gained creating, employing, and analyzing the results of the model. As a reminder three alternative military retirement systems were proposed: Option #1, Option #2, and Option #3. The details of each option can be reviewed in Appendix H: Alternative Retirement Plan Option #1, Appendix I: Alternative Retirement Plan Option #2, and Appendix J: Alternative Retirement Plan Option #3.

5.2 Conclusions

The basic objective of this Thesis was to compare the total annual cost of the current military retirement system with the total annual cost of alternative systems recommended by the author. To this end, a literature review was carried out to provide a better understanding of the problem. Next, a model was developed and assumptions were made to facilitate an estimate of the total annual cost of the present military retirement system and the proposed alternative retirement systems. Finally, the calculations were performed and results were presented in Chapter 4, which provided the information necessary to answer the research question. It must be stressed that the answer was

provided by cost and benefit estimates based on the author's assimilation of information relating to the military retirement system. The answer and other evaluations in this thesis are solely the author's judgment and do not necessarily reflect the position of the U.S. Government or its agencies. The conclusion of this thesis will be presented by answering the research question using a benefit-cost ratio (B/C) analysis.

The B/C ratio is a method of comparing alternatives and can be defined as the ratio of the equivalent annual worth of benefits to the equivalent annual worth of costs. In fact, the B/C ratio has experienced considerable usage in the public and private sector. Many federal government agencies and departments, as well as the United States Postal Service and a number of public utilities, use B/C ratio methods in performing economic analyses (21:193). To determine the B/C ratio of the deterministic and stochastic portions of the model, the costs and benefits of each retirement plan must be annualized. For the current retirement plans and alternative retirement plans, the annualized benefits are simply the annuities provided by each plan. The annualized costs of the current retirement plans are calculated by multiplying the respective Normal Cost Percentage (NCP) by the member's annual gross base pay. A member's final annual gross base pay from their last year of service is used for the High-Three Years Plan and an average of the member's annual gross base pay from their last three years of service is used for the High-Three Years Plan and REDUX Plan. The annualized cost of the alternative retirement plans are calculated by adding the final year of service contribution from the member and the government matching and vesting contributions. Table 29, Table 30, Table 31, and Table 32 compare the B/C ratios of each retirement plan for the deterministic portion of the model.

Table 29. 30 Years of Service Officer Retirement Plans B/C Ratio Comparison (Deterministic).

30 YOS OFFICER RETIREMENT PLANS B/C RATIO COMPARISON (DETERMINISTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$31,759	$74,903	2.36	6
High-Three Years Plan	$27,684	$71,843	2.60	5
REDUX Plan	$25,768	$85,675	3.32	4
Option #1	$19,974	$159,859	8.00	1
Option #2	$25,967	$107,679	4.15	2
Option #3	$38,950	$154,460	3.97	3

Table 30. 20 Years of Service Officer Retirement Plans B/C Ratio Comparison (Deterministic).

20 YOS OFFICER RETIREMENT PLANS B/C RATIO COMPARISON (DETERMINISTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$22,096	$34,742	1.57	6
High-Three Years Plan	$18,860	$32,629	1.73	4
REDUX Plan	$17,555	$29,469	1.68	5
Option #1	$20,845	$53,913	2.59	1
Option #2	$12,507	$32,348	2.59	1
Option #3	$20,150	$45,462	2.26	3

Table 31. 30 Years of Service Enlisted Retirement Plans B/C Ratio Comparison (Deterministic).

30 YOS ENLISTED RETIREMENT PLANS B/C RATIO COMPARISON (DETERMINISTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$15,496	$36,547	2.36	6
High-Three Years Plan	$13,484	$34,994	2.60	5
REDUX Plan	$12,551	$48,898	3.90	4
Option #1	$9,746	$82,882	8.50	1
Option #2	$12,670	$55,908	4.41	2
Option #3	$19,005	$80,398	4.23	3

Table 32. 20 Years of Service Enlisted Retirement Plans B/C Ratio Comparison (Deterministic).

20 YOS ENLISTED RETIREMENT PLANS B/C RATIO COMPARISON (DETERMINISTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$11,975	$18,828	1.57	6
High-Three Years Plan	$10,156	$17,572	1.73	5
REDUX Plan	$9,454	$17,435	1.84	4
Option #1	$11,297	$27,858	2.47	1
Option #2	$6,778	$16,715	2.47	1
Option #3	$10,920	$23,485	2.15	3

Overall, the results from the tables above support the results obtained in Chapter 4. From

a B/C ratio perspective the alternative retirement plan Option #1 provides the most value

to the government and the military member. However, alternative retirement plan Option

#2 provides an equally valuable B/C ratio for 20 years of service officer and enlisted

members. Option #2 is the least costly to the government, but the benefit annuities for 20 years of service officer and enlisted members are lower than the current military retirement system plans.

Table 33, Table 34,

Table 35, and Table 36 compare the B/C ratios of each retirement plan for the stochastic portion of the model. Overall, the results from the tables support the results obtained in Chapter 4. In addition, the results are the same as those obtained from the deterministic portion of the model. From a B/C ratio perspective the alternative retirement plan Option #1 provides the most value to the government and the military member. However, alternative retirement plan Option #2 provides an equally valuable B/C ratio for 20 years of service officer and enlisted members. Option #2 is the least costly to the government, but the benefit annuities for 20 years of service officer and enlisted members are lower than the current military retirement system plans.

Table 33. 30 Years of Service Officer Retirement Plans B/C Ratio Comparison (Stochastic).

30 YOS OFFICER RETIREMENT PLANS B/C RATIO COMPARISON (STOCHASTIC)				
	Annual System Costs	**Annual System Benefits**	**B/C Ratio**	**RANK**
Final Basic Pay Plan	$96,349	$227,239	2.36	6
High-Three Years Plan	$84,555	$219,434	2.60	5
REDUX Plan	$78,704	$241,588	3.07	4
Option #1	$60,597	$569,302	9.39	1
Option #2	$78,776	$383,071	4.86	2
Option #3	$118,164	$544,028	4.60	3

Table 34. 20 Years of Service Officer Retirement Plans B/C Ratio Comparison (Stochastic).

20 YOS OFFICER RETIREMENT PLANS B/C RATIO COMPARISON (STOCHASTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$47,064	$74,001	1.57	6
High-Three Years Plan	$40,588	$70,221	1.73	4
REDUX Plan	$37,779	$61,553	1.63	5
Option #1	$44,400	$112,535	2.53	1
Option #2	$26,640	$67,521	2.53	1
Option #3	$42,920	$95,098	2.22	3

Table 35. 30 Years of Service Enlisted Retirement Plans B/C Ratio Comparison (Stochastic).

30 YOS ENLISTED RETIREMENT PLANS B/C RATIO COMPARISON (STOCHASTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$49,251	$116,159	2.36	6
High-Three Years Plan	$43,222	$112,169	2.60	5
REDUX Plan	$40,231	$134,444	3.34	4
Option #1	$30,976	$305,236	9.85	1
Option #2	$40,268	$206,088	5.12	2
Option #3	$60,402	$293,609	4.86	3

Table 36. 20 Years of Service Officer Retirement Plans B/C Ratio Comparison (Stochastic).

20 YOS ENLISTED RETIREMENT PLANS B/C RATIO COMPARISON (STOCHASTIC)				
	Annual System Costs	Annual System Benefits	B/C Ratio	RANK
Final Basic Pay Plan	$26,477	$41,630	1.57	6
High-Three Years Plan	$22,766	$39,388	1.73	5
REDUX Plan	$21,191	$36,902	1.74	4
Option #1	$24,978	$59,460	2.38	1
Option #2	$14,987	$35,676	2.38	1
Option #3	$24,146	$50,334	2.08	3

Before any final conclusions are made, a discussion of how well the proposed

retirement plans are aligned with the requirements of the DoD retirement system

objectives (Section 2.2) is needed. While the make-up and total value of the benefits

afforded the retiree vary from plan to plan all three options result in benefits that meet the

needs of both the retiree and society as a whole. Each of the proposed alternative

military retirement plans also have the benefit of being more easily understood and

compared to civilian plans, thus allowing potential future military members to make a more informed decision as to whether the military is an acceptable employment opportunity. If future service members were allowed to select one of the proposed alternative military retirement plans, then they would see their retirement benefits amassing in accounts in their own names and have the ability to separate from the service at any point and take some of the retirement benefits with them to a new job. This would provide a strong incentive for new entrants to select military service. Sections 4.3 and 4.4 revealed that the benefits of Option #1 and Option #3 for 30 and 20 years of service members provided larger annuity payments when compared to the guaranteed perpetual annuity payments provided by the current military retirement system. In addition, Option #2 for 30 years of service members provided larger annuity payments when compared to the guaranteed perpetual annuity payments provided by the current military retirement system. However, it must be noted, that the proposed alternative military retirement plans benefit levels are subject to market risk, thus the returns on the TSP funds are not guaranteed. But, the model simulated the market risk and a military member should be confident (70%) in the potential returns associated with the alternative military retirement plans. Therefore, each of the proposed alternative military retirement plans are well aligned with the objective of providing for the future economic needs of military retirees.

Each of the proposed military retirement plans give the DoD the ability to adjust contribution percentages, which control the incentive provided to service members to separate at the appropriate time. Thus, implementation of any of the proposed military retirement plans would be aligned with the overall DoD retirement system objective of allowing for maintaining a young and vigorous force structure.

By requiring all personnel that serve their country for at least 20 years of service be available for recall, as is the case now, the objective of maintaining a pool of readily available personnel is met. Changing the retirement system structure from its existing make-up to one of the proposed alternative military retirement plans does not reduce the systems ability to meet this objective. All personnel serving for twenty or more years and enjoying the added benefits afforded them as a result would still be in the pool of readily available personnel.

There is no hard number of what cost is reasonable for the DoD military retirement system. However, the lower the cost the better seems to be the accepted standard. Each of the proposed alternative military retirement plans are aligned with this objective because each plan results in lower overall system costs. Although the actual cost of the system is dependent upon participation rates in each retirement plan, the Normal Cost Percentage (NCP) allows a relative comparison of the costs of each system. In fact, Section 4.2 showed that the DoD could potentially save over $5 billion dollars with the use of any one of the proposed alternative military retirement plans.

5.3   Recommendations

While the cost of the military retirement system has been an important issue the author believes that there are other issues that must be considered before any change is implemented. These issues warrant further research because of their potential impact on retirement costs, military personnel costs, and the military personnel system. The effects of a change in retirement policy on all components of the personnel system should be

considered before a change is made in order to ensure that the required numbers, quality, and structure of the military forces can be effectively and efficiently maintained.

A detailed study of the effect of any proposed changes in the retirement system on the retention rates and career patterns of personnel on active duty should be made. This study could be extended to include potential enlistees (high school students and recent graduates) and potential officers (college students and recent graduates) and could seek to determine the relative importance of pay, retirement, and other benefits on the decision to enter the military. Further, current and potential military personnel could be surveyed to determine what inducements might influence them to remain on active duty for a longer period or to enter the service, respectively. Also, former military personnel could be polled to determine what influenced them to leave the service and identify sources of discontent so that appropriate corrective action could be taken.

5.4 Summary

The B/C ratio analysis demonstrated that each of the proposed alternative military retirement options are attractive considerations for the DoD because they are aligned with the objectives of the military retirement system, cost the government less to administer, and provide a greater benefit level to the service member. Specifically, Option #1 would be less costly to the government and this plan would provide the greatest benefit level to the military member. Option #2 is the least costly of all the military retirement plans analyzed, but it provides a lower benefit level for 20 years of service officer and enlisted members when compared to the current military retirement plans. Overall, the author believes the benefit levels provided by Option #1 make it a much more attractive plan.

Therefore, the DoD should implement a smooth transition to a defined contribution

retirement plan similar to Option #1.

APPENDIX A: 2001 DoD Manpower Force Structure

(Source: DoD Valuation Report on the Military Retirement System)

OFFICERS ACTIVE DUTY PERSONNEL BY YEARS OF SERVICE AND AGE
Years of Active Service (2001)

AGE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	4	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-
21	786	15	27	8	4	-	-	-	-	-	-	-	-	-	-	-
22	1,325	104	39	6	12	1	-	-	-	-	-	-	-	-	-	-
23	2,331	2,489	106	31	26	17	-	1	-	-	-	-	-	-	-	-
24	1,420	3,999	2,525	81	39	42	16	2	-	-	-	-	-	-	-	-
25	668	1,963	3,666	2,465	79	56	48	28	-	-	-	-	-	-	-	-
26	591	803	1,740	3,633	2,139	126	60	78	43	1	-	-	-	-	-	-
27	553	676	882	1,847	3,133	1,891	187	103	123	71	-	3	-	-	-	-
28	333	615	691	843	1,617	2,707	1,753	199	160	182	94	1	-	-	-	-
29	300	487	614	759	906	1,466	2,529	1,605	272	230	252	202	1	1	-	-
30	237	390	436	642	770	938	1,540	2,451	1,496	328	306	387	275	4	-	-
31	179	311	396	444	698	789	950	1,564	2,406	1,597	366	343	511	321	4	1
32	150	233	328	325	371	621	753	877	1,509	2,290	1,351	330	416	522	335	7
33	142	201	221	267	247	327	554	602	768	1,398	1,846	1,298	326	461	598	337
34	93	176	174	199	197	230	320	451	547	703	1,330	1,797	1,329	368	476	625
35	96	112	123	181	158	164	207	313	461	608	712	1,199	2,126	1,304	400	486
36	63	147	106	115	151	133	200	194	286	477	542	673	1,509	1,983	1,258	401
37	56	109	99	109	109	118	129	169	194	315	410	504	789	1,461	1,951	1,435
38	43	90	80	104	96	86	105	116	167	296	452	620	861	1,286		1,935
39	36	66	67	74	56	87	75	84	139	169	211	285	400	573	736	1,248
40	49	63	50	66	62	70	72	74	102	121	168	186	261	398	545	765
41	26	41	43	48	55	49	71	53	93	97	115	135	199	238	428	540
42	17	26	32	35	42	60	49	48	51	81	98	106	160	188	236	372
43	10	31	32	39	25	36	42	42	41	60	78	71	116	131	189	272
44	13	26	24	15	23	30	32	40	42	48	59	76	76	95	144	209
45	16	13	14	15	20	27	36	38	41	50	69	67	83	100	103	178
46	7	4	9	10	13	14	16	26	24	49	42	68	77	72	89	125
47	14	10	5	17	11	6	24	15	22	38	43	57	63	66	67	102
48	5	8	8	4	8	10	13	11	16	38	20	29	44	63	64	92
49	1	9	8	7	7	5	12	9	16	23	30	38	32	39	47	77
50	3	3	5	7	4	4	8	8	13	15	23	30	25	32	39	67
51	4	1	6	2	2	9	7	5	4	16	14	16	22	24	33	32
52	2	3	3	8	5	9	2	6	8	13	22	13	24	16	23	30
53	4	2	2	5	4	7	4	7	7	13	9	10	21	23	17	24
54	2	1	3	8	5	5	7	10	7	11	7	10	17	14	19	30
55	2	2	4	3	4	3	5	7	7	2	9	7	12	19	16	14
56	1	1	2	4	2	3	1	10	4	5	6	3	8	8	7	6
57	1	1	1	1	2	3	2	4	3	7	3	10	5	4	4	10
58	1	1	2	-	-	3	2	-	1	3	5	4	5	5	4	6
59	1	1	1	1	2	-	2	2	1	1	2	6	2	5	4	4
60+	-	-	1	2	2	-	3	3	3	3	6	10	13	14	13	12
TOTAL	**9,589**	**13,240**	**12,576**	**12,430**	**11,106**	**10,152**	**9,836**	**9,255**	**9,077**	**9,280**	**8,544**	**8,426**	**9,567**	**9,413**	**9,135**	**9,442**

OFFICERS ACTIVE DUTY PERSONNEL BY YEARS OF SERVICE AND AGE
Years of Active Service (2001)

AGE	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30+
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	364	6	-	-	-	-	-	-	-	-	-	-	-	-	-
35	649	347	4	-	-	-	-	-	-	-	-	-	-	-	-
36	549	728	335	7	-	-	-	-	-	-	-	-	-	-	-
37	376	582	703	316	12	-	-	-	-	-	-	-	-	-	-
38	1,493	457	571	575	319	4	-	-	-	-	-	-	-	-	-
39	1,873	1,539	441	432	429	237	7	-	-	-	-	-	-	-	-
40	1,176	1,929	1,486	394	346	323	219	6	-	-	-	-	-	-	-
41	692	1,183	1,755	1,491	273	264	315	213	8	-	-	-	-	-	-
42	538	644	1,157	1,757	1,095	186	203	297	160	5	-	-	-	-	-
43	389	510	615	1,014	1,268	939	167	185	261	132	6	-	-	-	-
44	273	378	522	601	711	985	938	163	176	182	112	4	1	-	-
45	188	252	365	488	419	542	882	720	140	135	173	92	4	-	-
46	144	192	259	367	321	329	461	737	616	131	106	118	60	5	-
47	149	132	200	248	261	234	266	394	697	575	95	116	120	62	1
48	94	114	143	216	179	211	231	212	401	602	476	91	85	91	29
49	98	105	135	154	138	128	170	167	169	293	456	412	72	97	68
50	68	87	120	110	85	101	116	105	127	165	221	356	297	56	94
51	46	65	80	94	74	73	73	86	94	107	107	199	278	258	144
52	49	74	79	68	40	53	50	53	57	62	93	98	177	240	214
53	33	39	64	73	44	43	41	44	47	64	63	68	93	123	263
54	28	40	38	56	45	35	32	37	36	37	38	58	73	54	255
55	30	31	29	35	37	34	31	23	33	21	27	35	46	59	230
56	13	13	13	30	23	23	20	18	14	19	21	18	19	27	112
57	5	11	18	22	13	14	12	12	17	12	11	14	6	10	82
58	9	10	15	15	9	12	8	10	9	9	7	9	7	8	46
59	13	12	10	10	9	4	7	9	7	8	5	4	5	3	39
60+	18	20	23	17	11	13	16	9	10	14	7	7	4	4	39
TOTAL	**9,360**	**9,500**	**9,180**	**8,590**	**6,161**	**4,787**	**4,265**	**3,500**	**3,079**	**2,573**	**2,024**	**1,699**	**1,347**	**1,097**	**1,616**

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ENLISTED ACTIVE DUTY PERSONNEL BY YEARS OF SERVICE AND AGE
Years of Active Service (2001)

AGE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	299	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	22,450	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	47,095	21,805	193	4	-	-	-	-	-	-	-	-	-	-	-	-
20	32,712	43,875	18,451	84	1	-	-	-	-	-	-	-	-	-	-	-
21	19,441	29,845	38,430	15,065	54	1	-	-	-	-	-	-	-	-	-	-
22	12,657	17,520	26,276	31,808	8,507	31	3	-	-	-	-	-	-	-	-	-
23	8,269	11,021	14,783	22,160	18,169	5,875	14	1	-	-	-	-	-	-	-	-
24	5,975	7,543	9,416	12,991	14,603	13,308	4,251	8	-	-	-	-	-	-	-	-
25	4,303	5,278	6,513	8,279	9,202	11,344	9,644	3,475	8	2	-	-	-	-	-	-
26	2,979	3,681	4,472	5,734	6,270	7,173	8,276	8,835	3,230	13	2	-	-	-	-	-
27	2,142	2,625	3,273	3,983	4,459	5,030	5,647	7,579	7,798	3,037	6	-	-	-	-	-
28	1,692	1,838	2,243	2,855	3,202	3,554	3,688	4,866	7,251	7,227	2,501	11	-	-	-	-
29	1,281	1,376	1,699	1,983	2,493	2,659	2,786	3,324	4,813	6,589	5,998	2,889	14	1	-	-
30	990	1,143	1,331	1,513	1,872	2,063	2,177	2,454	3,314	4,571	5,506	6,930	3,140	16	4	-
31	851	923	1,016	1,263	1,406	1,671	1,664	1,954	2,370	3,263	3,860	5,732	7,129	2,890	16	-
32	657	655	701	833	1,107	1,131	1,108	1,397	1,666	2,201	2,487	3,438	5,694	6,183	3,182	20
33	508	463	562	609	773	852	756	945	1,250	1,735	1,781	2,302	3,427	4,994	6,528	3,441
34	405	422	411	458	598	622	621	701	863	1,161	1,380	1,647	2,317	3,063	5,591	7,300
35	379	381	340	360	438	489	501	531	665	826	1,040	1,315	1,670	2,330	3,762	6,199
36	163	344	364	352	366	375	384	400	544	602	817	1,017	1,427	1,683	2,833	4,307
37	105	123	292	297	297	340	318	357	416	509	633	800	1,180	1,433	2,159	3,098
38	90	71	125	275	246	265	235	255	340	409	519	545	793	1,241	1,686	2,327
39	64	58	63	98	256	182	180	203	251	294	363	464	584	875	1,320	1,837
40	47	46	35	59	102	191	151	163	199	208	266	304	450	620	1,059	1,334
41	39	40	43	47	39	85	141	151	182	163	212	262	329	440	683	994
42	34	44	26	28	37	36	74	125	136	140	183	190	214	310	494	723
43	20	33	22	39	32	27	23	59	113	120	123	171	189	232	363	493
44	21	17	20	18	16	25	22	18	42	86	115	150	192	254	357
45	8	24	18	10	14	15	13	26	28	38	105	90	121	126	205	251
46	10	12	8	12	20	17	22	27	28	25	43	77	108	116	152	236
47	1	9	6	12	8	12	15	18	29	22	27	47	79	114	153	180
48	1	7	5	2	3	9	1	15	16	15	23	21	57	75	94	142
49	6	6	2	7	7	4	3	7	7	11	15	30	25	49	93	128
50	3	5	5	5	3	5	5	2	9	7	11	14	37	24	62	116
51	2	1	5	5	5	2	5	3	5	8	14	21	22	36	34	64
52	5	3	6	1	6	7	2	5	3	8	10	16	21	32	34	42
53	1	4	1	1	2	2	1	7	6	4	3	14	18	17	44	29
54	4	1	4	2	2	6	2	3	1	7	12	7	18	21	27	42
55	1	-	2	4	2	2	3	3	2	2	2	13	13	17	22	34
56	-	1	1	-	-	2	1	1	2	1	1	3	4	11	25	19
57	1	-	-	1	-	-	1	1	3	2	4	3	4	4	8	19
58	-	1	-	1	-	-	-	2	1	2	3	2	2	3	4	14
59	-	-	-	-	-	-	-	1	2	2	-	2	1	6	4	16
60+	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	2
TOTAL	**165,711**	**151,541**	**131,163**	**111,258**	**74,617**	**57,412**	**42,738**	**37,922**	**35,593**	**33,310**	**28,065**	**28,504**	**29,237**	**27,156**	**30,896**	**33,764**

ENLISTED ACTIVE DUTY PERSONNEL BY YEARS OF SERVICE AND AGE
Years of Active Service (2001)

AGE	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30+
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	20	5	-	-	-	-	-	-	-	-	-	-	-	-	-
34	3,318	16	1	-	-	-	-	-	-	-	-	-	-	-	-
35	7,481	3,286	18	-	-	-	-	-	-	-	-	-	-	-	-
36	6,466	7,787	2,924	37	3	-	-	-	-	-	-	-	-	-	-
37	4,603	7,180	7,229	3,774	42	1	-	-	-	-	-	-	-	-	-
38	3,208	4,666	6,621	7,671	2,819	41	-	-	-	-	-	-	-	-	-
39	2,353	3,250	4,418	6,428	4,623	1,755	37	-	-	-	-	-	-	-	-
40	1,651	2,459	3,204	4,184	3,527	2,825	1,355	25	-	-	-	-	-	-	-
41	1,323	1,799	2,389	2,924	2,200	2,013	1,980	1,016	18	-	-	-	-	-	-
42	1,056	1,258	1,824	2,147	1,360	1,223	1,269	1,591	658	9	1	-	-	-	-
43	656	922	1,242	1,512	1,027	880	807	1,010	1,012	436	8	-	-	-	-
44	519	676	981	1,168	699	621	547	593	667	718	241	20	-	-	-
45	351	486	693	917	551	435	347	412	389	465	347	201	11	-	-
46	294	387	508	602	335	317	280	290	281	308	266	278	170	5	-
47	208	239	345	428	236	179	194	212	172	198	170	229	255	115	2
48	163	219	269	316	184	147	134	153	98	127	113	108	177	170	18
49	158	177	221	212	114	112	97	87	79	89	104	84	116	194	24
50	146	140	194	166	87	79	59	73	52	63	69	61	65	101	27
51	103	135	167	136	78	51	39	39	35	41	47	49	55	42	9
52	53	118	126	115	74	36	27	37	26	24	36	24	30	38	11
53	47	73	113	78	68	53	28	17	16	19	8	14	20	25	15
54	52	56	80	93	60	22	24	20	12	13	6	9	9	13	7
55	58	42	66	54	51	33	17	8	6	7	2	3	8	6	6
56	31	32	34	36	19	19	11	3	1	3	3	2	4	2	1
57	14	31	25	26	11	5	6	8	1	1	1	1	-	1	1
58	17	14	23	26	10	3	7	1	2	1	1	-	1	-	-
59	13	14	19	13	13	3	5	3	6	-	-	-	-	1	-
60+	8	3	11	15	7	1	1	-	1	2	1	-	-	1	1
TOTAL	**34,371**	**35,470**	**33,745**	**33,078**	**18,198**	**10,854**	**7,271**	**5,598**	**3,532**	**2,524**	**1,424**	**1,083**	**921**	**714**	**122**

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Appendix B: 2001 DoD Average Monthly Basic Pay

(Source: DoD Valuation Report on the Military Retirement System)

2001 OFFICER AVERAGE MONTHLY ACTIVE DUTY BASIC PAY BY ACTIVE YEARS OF SERVICE AND AGE

AGE	Years of Active Service															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	1,865	1,865	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	1,921	1,865	2,138	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2,093	2,141	2,232	2,414	2,628	-	-	-	-	-	-	-	-	-	-	-
22	2,095	2,115	2,232	2,419	2,446	3,650	-	-	-	-	-	-	-	-	-	-
23	2,119	2,115	2,321	2,523	2,475	2,673	-	3,825	-	-	-	-	-	-	-	-
24	2,147	2,146	2,706	2,813	2,652	2,597	2,623	2,978	-	-	-	-	-	-	-	-
25	2,198	2,233	2,726	3,132	3,096	2,710	2,652	2,698	-	-	-	-	-	-	-	-
26	2,434	2,341	2,771	3,161	3,547	3,046	2,768	2,694	2,870	4,383	-	-	-	-	-	-
27	2,590	2,532	2,817	3,186	3,547	3,563	3,229	2,968	2,941	2,826	-	4,131	-	-	-	-
28	2,513	2,580	2,952	3,166	3,522	3,598	3,740	3,285	3,045	2,889	3,047	2,639	-	-	-	-
29	2,694	2,671	3,057	3,241	3,457	3,566	3,767	3,743	3,335	3,068	3,110	3,044	4,383	4,490	-	-
30	2,794	2,800	3,073	3,282	3,514	3,524	3,736	3,807	3,906	3,387	3,125	3,120	3,186	3,784	-	-
31	2,887	2,888	3,143	3,333	3,561	3,563	3,707	3,834	3,962	3,914	3,466	3,267	3,160	3,323	3,287	2,748
32	3,076	3,061	3,309	3,429	3,539	3,650	3,823	3,795	3,970	4,020	4,187	3,583	3,401	3,281	3,451	2,872
33	3,348	2,991	3,477	3,606	3,626	3,893	3,931	3,988	4,081	4,243	4,384	3,650	3,390	3,435	3,520	-
34	3,315	3,365	3,563	3,794	3,784	3,712	3,906	4,009	4,078	4,095	4,257	4,506	4,606	3,701	3,565	3,436
35	3,397	3,129	3,631	3,828	3,887	3,912	4,013	4,058	4,148	4,171	4,269	4,526	4,684	4,633	3,764	3,589
36	3,708	3,409	3,892	3,824	4,100	3,944	4,038	4,084	4,232	4,235	4,411	4,466	4,679	4,761	4,743	3,928
37	3,595	3,412	4,017	4,106	4,097	4,149	4,246	4,233	4,354	4,284	4,474	4,541	4,684	4,788	4,863	4,804
38	3,993	3,503	3,965	4,087	4,136	4,265	4,326	4,301	4,428	4,348	4,518	4,578	4,692	4,718	4,841	4,959
39	3,586	3,426	3,906	4,131	4,248	4,115	4,258	4,355	4,464	4,489	4,575	4,586	4,719	4,838	4,818	4,926
40	3,627	3,195	3,643	4,229	4,218	4,135	4,347	4,479	4,497	4,455	4,573	4,621	4,778	4,877	4,938	4,918
41	3,826	3,044	3,669	3,841	4,278	4,212	4,494	4,543	4,558	4,516	4,632	4,695	4,731	4,860	4,979	4,959
42	3,790	3,598	3,581	4,244	4,455	4,417	4,418	4,379	4,388	4,699	4,606	4,757	4,812	4,828	4,988	5,142
43	3,544	3,622	3,655	4,045	4,311	4,481	4,641	4,561	4,656	4,560	4,876	4,800	4,912	5,041	5,018	5,125
44	4,041	3,522	3,902	4,390	4,239	4,245	4,408	4,633	4,838	4,619	4,613	4,831	4,992	5,040	5,091	5,202
45	4,588	3,329	4,090	4,150	4,574	4,176	4,626	4,489	4,571	4,566	4,732	4,873	5,003	4,997	5,198	5,145
46	3,656	3,680	4,055	4,328	4,362	4,658	4,968	4,789	4,634	5,034	5,036	5,064	5,136	5,228	5,315	-
47	3,644	2,969	4,055	4,344	4,573	4,289	4,660	4,503	4,547	4,875	4,779	5,005	5,079	5,120	5,043	5,438
48	4,495	3,826	4,445	3,775	4,105	4,722	5,031	4,535	4,626	4,852	5,007	4,695	5,095	5,221	5,255	5,375
49	6,239	4,026	4,276	4,204	5,007	4,439	4,856	4,838	5,013	4,866	4,810	4,999	5,080	5,429	5,425	5,441
50	3,721	5,076	4,445	4,944	3,891	4,272	4,919	4,980	5,376	5,164	4,967	4,910	5,403	5,321	5,437	5,582
51	3,985	6,057	4,974	4,280	7,646	5,449	5,080	4,918	4,870	4,805	5,410	5,311	5,214	5,488	5,459	5,938
52	4,125	3,727	6,708	4,855	4,137	4,801	6,947	4,428	5,658	4,739	5,609	5,078	5,309	5,445	5,678	5,778
53	6,242	5,009	6,431	4,614	5,082	5,140	4,504	5,660	5,521	5,627	5,171	4,883	5,461	5,509	5,865	6,090
54	3,913	3,315	5,664	5,071	6,986	6,662	5,327	5,660	4,980	5,638	5,846	4,968	5,525	5,681	5,508	5,783
55	5,943	5,341	5,009	5,637	6,169	5,750	5,634	5,873	5,988	4,807	5,348	5,271	5,215	5,937	5,840	6,148
56	2,970	5,216	7,284	8,410	5,352	5,715	4,802	6,017	5,208	5,390	5,512	5,943	6,971	5,878	5,860	6,050
57	7,646	4,405	9,814	5,356	7,435	6,339	6,224	2,512	6,202	5,857	5,256	5,220	6,287	7,726	5,858	6,200
58	7,646	9,814	4,136	-	-	5,762	4,501	-	4,802	7,646	4,903	5,220	5,707	5,092	6,943	6,781
59	7,646	7,646	5,356	4,490	6,943	-	4,527	6,184	7,646	4,802	6,501	5,551	6,520	6,219	5,826	6,937
60+	-	-	3,490	5,764	5,516	-	6,143	6,620	4,464	5,972	5,282	6,055	5,845	5,141	6,785	5,985

2001 OFFICER AVERAGE MONTHLY ACTIVE DUTY BASIC PAY BY ACTIVE YEARS OF SERVICE AND AGE

AGE	Years of Active Service														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30+
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	4,058	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	3,548	3,673	-	-	-	-	-	-	-	-	-	-	-	-	-
35	3,656	3,694	4,463	-	-	-	-	-	-	-	-	-	-	-	-
36	3,749	3,830	3,898	3,944	-	-	-	-	-	-	-	-	-	-	-
37	4,080	3,914	3,958	4,018	4,277	-	-	-	-	-	-	-	-	-	-
38	5,077	4,251	4,063	4,104	4,272	4,385	-	-	-	-	-	-	-	-	-
39	5,215	5,291	4,412	4,252	4,348	4,430	3,997	-	-	-	-	-	-	-	-
40	5,209	5,420	5,443	4,635	4,420	4,418	4,572	4,729	-	-	-	-	-	-	-
41	5,161	5,371	5,589	5,556	4,714	4,552	4,566	4,681	4,290	-	-	-	-	-	-
42	5,201	5,286	5,483	5,633	5,803	4,916	4,651	4,755	4,784	4,618	-	-	-	-	-
43	5,364	5,489	5,476	5,573	5,858	5,973	5,137	4,894	4,915	4,960	5,151	-	-	-	-
44	5,376	5,519	5,608	5,552	5,797	6,025	6,426	5,173	4,948	5,001	5,124	4,864	4,490	-	-
45	5,356	5,549	5,741	5,818	5,850	6,001	6,488	6,600	5,440	5,154	5,285	5,187	5,623	-	-
46	5,418	5,609	5,594	5,822	6,042	5,985	6,434	6,729	6,759	6,542	5,407	5,365	5,386	5,077	-
47	5,516	5,651	5,810	5,837	6,160	6,342	6,393	6,595	6,839	6,863	5,577	5,640	5,548	5,533	6,239
48	5,579	5,681	5,646	5,922	6,118	6,347	6,526	6,514	6,794	6,927	7,220	6,032	5,626	5,669	5,740
49	5,469	5,691	5,899	5,824	6,206	6,342	6,793	6,695	6,789	6,904	7,246	7,386	6,104	5,657	6,083
50	5,691	5,884	6,001	5,995	6,181	6,407	6,582	6,728	6,887	6,820	7,133	7,349	7,566	6,122	6,169
51	5,644	5,874	6,074	6,065	6,373	6,131	6,623	6,842	6,839	6,786	7,095	7,179	7,632	7,694	6,610
52	5,954	5,754	6,175	6,139	6,297	6,318	6,639	6,798	7,018	7,006	7,122	6,946	7,382	7,771	7,440
53	6,042	6,182	6,157	5,995	6,760	6,225	6,644	6,675	7,019	6,864	7,039	7,027	7,289	7,531	7,637
54	5,868	6,074	6,189	6,155	6,375	6,463	6,525	6,938	6,495	6,896	7,181	7,127	7,458	7,301	7,792
55	5,940	6,182	6,329	6,095	6,282	6,371	6,782	7,045	6,682	7,104	7,345	7,116	7,054	7,390	8,239
56	5,919	6,142	6,192	6,487	6,049	6,304	7,126	6,931	7,420	6,820	7,015	7,193	7,613	7,366	8,374
57	6,866	6,122	6,729	6,116	6,798	6,666	6,406	7,089	7,479	7,279	6,767	7,409	6,995	7,646	8,476
58	5,630	6,076	6,185	6,564	6,728	6,396	6,003	7,479	7,096	7,423	7,228	7,020	7,040	7,542	8,210
59	5,913	6,531	5,941	6,258	6,980	6,943	6,603	7,018	7,252	7,236	7,363	6,941	7,080	7,177	7,606
60+	5,912	6,340	6,148	6,804	6,779	6,362	6,687	6,908	7,189	7,195	7,040	7,443	7,646	6,309	7,847

2001 ENLISTED AVERAGE MONTHLY ACTIVE DUTY BASIC PAY BY ACTIVE YEARS OF SERVICE AND AGE

Years of Active Service

AGE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	1,094	1,181	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	1,100	1,241	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	1,126	1,251	1,349	1,363	-	-	-	-	-	-	-	-	-	-	-	-
20	1,167	1,257	1,397	1,534	1,271	-	-	-	-	-	-	-	-	-	-	-
21	1,180	1,265	1,408	1,553	1,683	1,975	-	-	-	-	-	-	-	-	-	-
22	1,189	1,271	1,424	1,560	1,679	1,736	1,773	-	-	-	-	-	-	-	-	-
23	1,202	1,278	1,433	1,566	1,683	1,723	1,848	1,729	-	-	-	-	-	-	-	-
24	1,218	1,283	1,443	1,573	1,688	1,726	1,833	1,910	-	-	-	-	-	-	-	-
25	1,230	1,292	1,453	1,580	1,694	1,729	1,831	1,864	2,028	1,795	-	-	-	-	-	-
26	1,240	1,304	1,465	1,591	1,700	1,735	1,838	1,865	2,006	2,054	2,164	-	-	-	-	-
27	1,265	1,317	1,473	1,598	1,710	1,748	1,842	1,875	2,002	2,029	2,037	-	-	-	-	-
28	1,287	1,325	1,481	1,612	1,718	1,757	1,852	1,879	2,002	2,028	2,145	2,195	-	-	-	-
29	1,312	1,364	1,501	1,628	1,732	1,766	1,862	1,896	2,005	2,034	2,140	2,179	2,339	2,134	-	-
30	1,346	1,368	1,528	1,643	1,738	1,785	1,881	1,919	2,017	2,041	2,145	2,170	2,295	2,439	2,338	-
31	1,420	1,415	1,543	1,668	1,760	1,803	1,902	1,937	2,038	2,054	2,155	2,177	2,280	2,333	2,392	-
32	1,413	1,477	1,574	1,693	1,787	1,815	1,915	1,962	2,058	2,070	2,171	2,196	2,286	2,333	2,428	2,430
33	1,435	1,465	1,616	1,742	1,785	1,840	1,931	1,988	2,069	2,095	2,183	2,215	2,297	2,335	2,420	2,477
34	1,499	1,555	1,647	1,770	1,823	1,859	1,951	2,001	2,094	2,097	2,203	2,228	2,297	2,340	2,417	2,470
35	1,509	1,517	1,708	1,783	1,876	1,877	1,988	2,028	2,114	2,126	2,227	2,242	2,318	2,343	2,426	2,472
36	1,774	1,600	1,730	1,782	1,887	1,919	2,021	2,047	2,117	2,140	2,230	2,261	2,328	2,361	2,429	2,481
37	2,141	1,980	1,792	1,841	1,935	1,995	2,059	2,106	2,156	2,185	2,259	2,287	2,356	2,387	2,448	2,494
38	2,214	2,375	1,982	1,871	1,920	2,017	2,104	2,110	2,210	2,219	2,285	2,301	2,369	2,409	2,465	2,508
39	2,231	2,338	2,388	2,155	1,952	1,995	2,099	2,150	2,261	2,244	2,325	2,327	2,392	2,416	2,476	2,520
40	2,338	2,452	2,443	2,465	2,124	1,995	2,104	2,134	2,275	2,289	2,355	2,370	2,410	2,465	2,490	2,533
41	2,267	2,456	2,573	2,505	2,603	2,225	2,106	2,204	2,264	2,273	2,388	2,432	2,433	2,445	2,507	2,538
42	2,303	2,351	2,478	2,503	2,595	2,314	2,314	2,169	2,340	2,326	2,395	2,429	2,470	2,507	2,523	2,550
43	2,297	2,579	2,454	2,510	2,657	2,634	2,761	2,343	2,212	2,341	2,424	2,399	2,489	2,569	2,537	2,578
44	2,225	2,385	2,494	2,527	2,636	2,520	2,626	2,688	2,542	2,285	2,354	2,498	2,563	2,557	2,615	2,596
45	2,199	2,546	2,490	2,459	2,782	2,553	2,741	2,562	2,845	2,474	2,481	2,459	2,573	2,502	2,652	2,681
46	2,471	2,406	2,161	2,369	2,702	2,789	2,793	2,635	2,841	2,808	2,678	2,545	2,572	2,568	2,605	2,627
47	2,533	2,593	2,602	2,709	2,565	2,574	2,672	2,898	2,909	2,796	2,672	2,667	2,523	2,568	2,618	2,712
48	2,274	2,627	2,593	2,622	2,861	2,567	2,352	2,697	2,719	2,646	2,949	2,999	2,783	2,615	2,573	2,669
49	2,152	2,482	2,966	2,472	3,382	3,148	2,366	2,479	2,610	2,826	2,822	2,923	2,978	2,827	2,609	2,892
50	2,452	2,633	2,506	2,795	3,112	2,926	2,867	2,336	3,070	3,182	2,813	3,162	3,080	2,937	2,802	2,851
51	2,139	1,445	2,728	2,820	2,784	2,868	3,015	2,267	3,199	3,003	2,902	3,166	3,223	3,219	3,215	3,043
52	2,872	2,460	2,993	2,533	2,337	2,578	3,243	2,520	3,245	3,188	2,921	2,800	3,013	3,173	3,131	3,313
53	4,248	2,745	4,248	3,282	3,130	2,511	2,533	3,069	2,967	2,731	2,494	2,853	2,844	3,214	3,203	3,253
54	3,330	2,707	2,884	3,287	3,826	2,824	3,400	3,504	2,948	2,819	3,151	3,452	3,151	3,059	3,163	3,232
55	2,134	-	3,826	2,402	2,796	3,323	3,121	3,325	2,817	2,794	3,322	3,456	2,988	3,125	3,189	3,187
56	-	3,429	4,248	-	-	2,794	2,533	3,174	2,746	2,134	3,400	2,960	2,944	2,783	3,189	3,463
57	2,134	-	-	2,533	-	-	2,868	3,174	3,855	3,589	2,884	3,684	2,971	3,023	3,246	3,200
58	-	4,248	-	3,282	-	-	-	3,824	3,779	3,561	2,817	2,827	3,243	3,295	3,192	3,136
59	-	-	-	-	-	-	-	3,400	2,979	3,826	-	2,990	2,533	3,235	3,142	3,318
60+	-	-	-	-	-	-	-	-	-	-	-	-	-	2,862	3,400	2,862

2001 ENLISTED AVERAGE MONTHLY ACTIVE DUTY BASIC PAY BY ACTIVE YEARS OF SERVICE AND AGE

Years of Active Service

AGE	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30+
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	2,432	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	2,565	2,647	-	-	-	-	-	-	-	-	-	-	-	-	-
34	2,588	2,707	2,134	-	-	-	-	-	-	-	-	-	-	-	-
35	2,582	2,667	2,789	-	-	-	-	-	-	-	-	-	-	-	-
36	2,579	2,677	2,793	2,759	2,768	-	-	-	-	-	-	-	-	-	-
37	2,583	2,675	2,766	2,819	3,029	3,282	-	-	-	-	-	-	-	-	-
38	2,597	2,674	2,752	2,815	2,978	3,130	-	-	-	-	-	-	-	-	-
39	2,606	2,680	2,753	2,796	2,975	3,110	3,274	-	-	-	-	-	-	-	-
40	2,630	2,681	2,769	2,790	2,986	3,112	3,331	3,548	-	-	-	-	-	-	-
41	2,627	2,687	2,766	2,790	2,985	3,103	3,318	3,447	3,758	-	-	-	-	-	-
42	2,622	2,709	2,778	2,805	2,990	3,116	3,330	3,490	3,718	4,007	4,248	-	-	-	-
43	2,634	2,710	2,768	2,801	3,016	3,110	3,321	3,489	3,721	3,839	4,248	-	-	-	-
44	2,664	2,749	2,796	2,818	3,011	3,125	3,345	3,444	3,724	4,155	4,224	-	-	-	-
45	2,726	2,755	2,821	2,818	3,038	3,129	3,377	3,479	3,746	3,835	4,138	4,169	4,248	-	-
46	2,740	2,761	2,813	2,817	3,033	3,154	3,340	3,499	3,739	3,869	4,121	4,191	4,230	4,155	-
47	2,778	2,770	2,819	2,819	3,095	3,202	3,339	3,511	3,789	3,861	4,140	4,187	4,240	4,248	4,248
48	2,774	2,812	2,892	2,860	3,080	3,204	3,371	3,461	3,719	3,852	4,128	4,190	4,216	4,248	4,248
49	2,867	2,915	2,951	2,925	3,208	3,242	3,414	3,510	3,752	3,826	4,150	4,225	4,232	4,245	4,203
50	2,942	2,988	3,032	3,020	3,132	3,403	3,378	3,490	3,753	3,928	4,158	4,141	4,240	4,248	4,217
51	2,911	3,067	3,116	3,077	3,257	3,423	3,447	3,481	3,725	3,861	4,095	4,152	4,222	4,248	4,248
52	3,236	3,075	3,235	3,093	3,316	3,463	3,595	3,600	3,851	3,912	4,081	4,189	4,215	4,235	4,248
53	3,193	3,262	3,190	3,154	3,259	3,457	3,550	3,577	3,859	3,815	4,130	4,148	4,079	4,248	3,928
54	3,322	3,363	3,307	3,098	3,550	3,484	3,629	3,676	3,730	3,772	4,248	4,143	4,248	4,248	3,993
55	3,373	3,382	3,534	3,311	3,489	3,681	3,737	3,458	3,794	4,028	3,779	3,812	4,248	4,248	4,248
56	3,229	3,342	3,497	3,398	3,526	3,439	3,736	3,243	3,779	4,091	3,809	4,248	4,248	4,248	4,248
57	3,484	3,412	3,568	3,471	3,644	3,984	3,732	3,993	4,248	4,248	4,248	4,248	-	4,248	4,248
58	3,332	3,229	3,327	3,582	3,575	3,528	3,658	4,248	3,589	4,248	-	4,248	-	-	-
59	3,257	3,355	3,500	3,549	3,383	3,810	3,751	3,112	3,873	-	-	-	-	4,248	-
60+	3,526	3,584	3,409	3,428	3,688	3,779	3,779	-	3,779	4,013	3,400	-	-	4,248	4,248

Appendix C: Historical Military Basic Pay Scale Increases

(Source: DoD Valuation Report on the Military Retirement System)

Date of Increase	Percentage Increase
6/1/1958	8.3%
10/1/1963	14.2%
9/1/1964	2.3%
9/1/1965	10.4%
7/1/1966	3.2%
10/1/1967	5.6%
7/1/1968	6.9%
7/1/1969	12.6%
1/1/1970	8.1%
1/1/1971	7.9%
11/14/1971	11.6%
1/1/1972	7.2%
10/1/1972	6.7%
10/1/1973	6.2%
10/1/1974	5.5%
10/1/1975	5.0%
10/1/1976	3.6%
10/1/1977	6.2%
10/1/1978	5.5%
10/1/1979	7.0%
10/1/1980	11.7%
10/1/1981	14.3%
10/1/1982	4.0%
1/1/1984	4.0%
1/1/1985	4.0%
10/1/1985	3.0%
1/1/1987	3.0%
1/1/1988	2.0%
1/1/1989	4.1%
1/1/1990	3.6%
1/1/1991	4.1%
1/1/1992	4.2%
1/1/1993	3.7%
1/1/1994	2.2%
1/1/1995	2.6%
1/1/1996	2.4%
1/1/1997	3.0%
1/1/1998	2.8%
1/1/1999	3.6%
1/1/2000	4.8%
1/1/2001	3.7%

Appendix D: Typical DoD Career Progression & Corresponding Pay Rate
(1971 – 2001)

(Source: Office of the Under Secretary of Defense for Personnel and Readiness, Military Compensation)

TYPICAL DoD OFFICER CAREER PROGRESSION & CORRESPONDING PAY RATE

30 YOS MEMBER				20 YOS MEMBER			
Calendar Year	Years of Service	Pay Grade	Monthly Base Pay	Calendar Year	Years of Service	Pay Grade	Monthly Base Pay
1971	0	O-1	$450.60	1981	0	O-1	$924.30
1972	1	O-1	$530.70	1982	1	O-1	$1,056.60
1973	2	O-2	$712.50	1983	2	O-2	$1,382.40
1974	3	O-2	$908.70	1984	3	O-2	$1,727.10
1975	4	O-3	$1,108.20	1985	4	O-3	$2,076.30
1976	5	O-3	$1,163.70	1986	5	O-3	$2,138.70
1977	6	O-3	$1,263.30	1987	6	O-3	$2,308.20
1978	7	O-3	$1,341.60	1988	7	O-3	$2,354.40
1979	8	O-3	$1,466.70	1989	8	O-3	$2,538.90
1980	9	O-3	$1,569.60	1990	9	O-3	$2,630.40
1981	10	O-4	$1,939.20	1991	10	O-4	$3,029.10
1982	11	O-4	$2,216.40	1992	11	O-4	$3,156.30
1983	12	O-4	$2,434.80	1993	12	O-4	$3,456.90
1984	13	O-4	$2,532.30	1994	13	O-4	$3,533.10
1985	14	O-4	$2,753.70	1995	14	O-4	$3,790.20
1986	15	O-4	$2,836.20	1996	15	O-4	$3,881.10
1987	16	O-5	$3,324.00	1997	16	O-5	$4,549.20
1988	17	O-5	$3,390.60	1998	17	O-5	$4,676.70
1989	18	O-5	$3,732.00	1999	18	O-5	$5,122.20
1990	19	O-5	$3,866.40	2000	19	O-5	$5,402.10
1991	20	O-5	$4,146.60	2001	20	O-5	$5,790.30
1992	21	O-5	$4,320.90				
1993	22	O-6	$5,240.40				
1994	23	O-6	$5,355.60				
1995	24	O-6	$5,680.80				
1996	25	O-6	$5,817.00				
1997	26	O-6	$6,285.60				
1998	27	O-7	$7,354.80				
1999	28	O-7	$7,619.70				
2000	29	O-7	$8,005.50				
2001	30	O-7	$8,322.60				

TYPICAL DoD ENLISTED CAREER PROGRESSION & CORRESPONDING PAY RATE

30 YOS MEMBER				20 YOS MEMBER			
Calendar Year	Years of Service	Pay Grade	Monthly Base Pay	Calendar Year	Years of Service	Pay Grade	Monthly Base Pay
1971	0	E-1	$134.40	1981	0	E-1	$501.30
1972	1	E-2	$320.70	1982	1	E-2	$618.30
1973	2	E-3	$375.30	1983	2	E-3	$704.70
1974	3	E-4	$438.60	1984	3	E-4	$824.70
1975	4	E-5	$513.00	1985	4	E-5	$979.80
1976	5	E-5	$538.80	1986	5	E-5	$1,009.20
1977	6	E-5	$594.60	1987	6	E-5	$1,107.60
1978	7	E-5	$631.50	1988	7	E-5	$1,129.80
1979	8	E-6	$761.40	1989	8	E-6	$1,343.40
1980	9	E-6	$814.80	1990	9	E-6	$1,391.70
1981	10	E-6	$943.50	1991	10	E-6	$1,502.10
1982	11	E-6	$1,099.20	1992	11	E-6	$1,565.10
1983	12	E-7	$1,325.10	1993	12	E-7	$1,881.90
1984	13	E-7	$1,378.20	1994	13	E-7	$1,923.30
1985	14	E-7	$1,498.20	1995	14	E-7	$2,062.50
1986	15	E-7	$1,543.20	1996	15	E-7	$2,112.00
1987	16	E-7	$1,634.70	1997	16	E-7	$2,237.10
1988	17	E-8	$1,954.20	1998	17	E-8	$2,589.60
1989	18	E-8	$1,999.20	1999	18	E-8	$2,743.80
1990	19	E-8	$2,071.20	2000	19	E-8	$2,904.00
1991	20	E-8	$2,209.20	2001	20	E-8	$3,138.00
1992	21	E-9	$2,626.20				
1993	22	E-9	$2,866.20				
1994	23	E-9	$2,929.20				
1995	24	E-9	$3,122.40				
1996	25	E-9	$3,197.40				
1997	26	E-9	$3,478.50				
1998	27	E-9	$3,576.00				
1999	28	E-9	$3,704.70				
2000	29	E-9	$3,899.25				
2001	30	E-9	$4,060.80				

Appendix E: Nondisability Retired Life Expectancies

(Source: DoD Statistical Report on the Military Retirement System)

NONDISABILITY RETIRED LIFE EXPECTANCIES

AGE	OFFICERS	ENLISTED
35	49.26	45.36
36	48.22	44.32
37	47.17	43.29
38	46.13	42.25
39	45.09	41.21
40	44.04	40.17
41	43.00	39.14
42	41.96	38.09
43	40.92	37.05
44	39.87	36.01
45	38.83	34.96
46	37.78	33.92
47	36.74	32.89
48	35.70	31.85
49	34.65	30.83
50	33.61	29.81
51	32.57	28.79
52	31.52	27.78
53	30.49	26.78
54	29.46	25.79
55	28.44	24.82
56	27.43	23.86
57	26.43	22.93
58	25.45	22.00
59	24.48	21.10
60	23.52	20.22
61	22.58	19.35
62	21.65	18.50
63	20.73	17.68
64	19.83	16.87
65	18.95	16.09
66	18.08	15.33
67	17.23	14.59
68	16.40	13.87
69	15.58	13.18
70	14.79	12.51
71	14.01	11.86
72	13.26	11.23
73	12.53	10.63
74	11.82	10.05
75	11.13	9.49
76	10.47	8.95
77	9.82	8.44
78	9.20	7.95
79	8.60	7.48
80	8.02	7.03
81	7.46	6.61
82	6.93	6.21
83	6.42	5.83
84	5.94	5.47
85	5.48	5.13
86	5.06	4.81
87	4.66	4.51
88	4.29	4.23
89	3.94	3.96
90	3.62	3.71
91	3.32	3.48
92	3.04	3.25
93	2.79	3.04
94	2.55	2.85
95	2.34	2.65
96	2.15	2.47
97	1.98	2.28
98	1.83	2.11
99	1.69	1.96
100	1.56	1.82
101	1.45	1.70
102	1.34	1.58
103	1.24	1.46
104	1.14	1.36
105	1.06	1.26

Appendix F: Historical Returns for Thrift Savings Plan Funds

(Source: Guide to TSP Investments, http://www.tsp.gov/uniserv/forms/tspbk03.pdf)

YEAR	G-Fund Related Securities	F-Fund LBA Index	C-Fund S&P 500 Index
1971	8.61%	10.40%	14.15%
1972	8.61%	10.40%	14.15%
1973	8.61%	10.40%	14.15%
1974	8.61%	10.40%	14.15%
1975	8.61%	10.40%	14.15%
1976	8.61%	10.40%	14.15%
1977	8.61%	10.40%	14.15%
1978	8.61%	10.40%	14.15%
1979	8.61%	10.40%	14.15%
1980	8.61%	10.40%	14.15%
1981	14.18%	6.26%	-5.09%
1982	13.56%	32.64%	21.08%
1983	11.61%	8.37%	22.39%
1984	13.12%	15.15%	6.11%
1985	11.33%	22.13%	32.04%
1986	8.29%	15.25%	18.55%
1987	8.73%	2.76%	5.23%
1988	9.19%	7.89%	16.61%
1989	9.01%	14.53%	31.69%
1990	8.97%	8.96%	-3.10%
1991	8.26%	16.00%	30.47%
1992	7.32%	7.40%	7.62%
1993	6.23%	9.75%	10.08%
1994	7.29%	-2.92%	1.32%
1995	7.10%	18.47%	37.58%
1996	6.80%	3.63%	22.96%
1997	6.80%	9.65%	33.36%
1998	5.77%	8.69%	28.58%
1999	6.03%	-0.82%	21.04%
2000	6.42%	11.63%	-9.10%
2001	5.36%	8.44%	-11.89%
Compound Annual Rate of Return	**8.61%**	**10.40%**	**14.15%**

YEAR	S-Fund Wilshire 4500 Index	I-Fund EAFE Index
1971	11.57%	10.38%
1972	11.57%	10.38%
1973	11.57%	10.38%
1974	11.57%	10.38%
1975	11.57%	10.38%
1976	11.57%	10.38%
1977	11.57%	10.38%
1978	11.57%	10.38%
1979	11.57%	10.38%
1980	11.57%	10.38%
1981	-1.65%	-2.28%
1982	13.73%	-1.86%
1983	24.75%	23.69%
1984	-1.72%	7.38%
1985	32.02%	56.16%
1986	11.76%	67.42%
1987	-3.51%	27.40%
1988	20.54%	28.25%
1989	23.94%	10.36%
1990	-13.56%	-23.59%
1991	43.45%	12.19%
1992	11.87%	-12.22%
1993	14.57%	32.68%
1994	-2.66%	7.75%
1995	33.48%	11.27%
1996	17.18%	6.14%
1997	25.69%	1.55%
1998	8.63%	20.09%
1999	35.49%	26.72%
2000	-15.77%	-14.17%
2001	-9.33%	-21.44%
Compound Annual Rate of Return	**11.57%**	**10.38%**

Appendix G: Historical Inflation Rates

(Source: Economic History Services, http://www.eh.net/ehresources/howmuch/inflationq.php)

HISTORICAL INFLATION RATE DATA

YEAR	INFLATION RATE
1971	4.31%
1972	3.31%
1973	6.20%
1974	11.11%
1975	8.98%
1976	5.75%
1977	6.62%
1978	7.59%
1979	11.28%
1980	13.48%
1981	10.36%
1982	6.16%
1983	3.21%
1984	4.37%
1985	3.54%
1986	1.86%
1987	3.66%
1988	4.12%
1989	4.81%
1990	5.39%
1991	4.22%
1992	3.01%
1993	2.98%
1994	2.60%
1995	2.76%
1996	2.96%
1997	2.35%
1998	1.51%
1999	2.21%
2000	3.38%
2001	2.86%

Appendix H: Alternative Retirement Plan Option #1

OPTION #1 VESTING PERCENTAGES FOR TSP RETIREMENT FUND

Member Contribution	5%	Average Tax Rate	16%
Government Matching Contribution	5%		
Government Vesting Contribution			

YOS	
0	0%
1	5%
2	5%
3	5%
4	5%
5	5%
6	10%
7	10%
8	10%
9	10%
10	10%
11	15%
12	15%
13	15%
14	15%
15	15%
16	20%
17	20%
18	20%
19	20%
20	20%
21	15%
22	15%
23	15%
24	15%
25	15%
26	10%
27	10%
28	10%
29	10%
30	10%

Appendix I: Alternative Retirement Plan Option #2

OPTION #2 VESTING PERCENTAGES FOR TSP RETIREMENT FUND			
Member Contribution	3%	Average Tax Rate	16%
Government Matching Contribution	3%		
Government Vesting Contribution			
YOS			
0	0%		
1	3%		
2	3%		
3	3%		
4	3%		
5	3%		
6	6%		
7	6%		
8	6%		
9	6%		
10	6%		
11	9%		
12	9%		
13	9%		
14	9%		
15	9%		
16	12%		
17	12%		
18	12%		
19	12%		
20	12%		
21	15%		
22	15%		
23	15%		
24	15%		
25	15%		
26	20%		
27	20%		
28	20%		
29	20%		
30	20%		

Appendix J: Alternative Retirement Plan Option #3

OPTION #3 VESTING PERCENTAGES FOR TSP RETIREMENT FUND				
Member Contribution		3%	Average Tax Rate	16%
Government Matching Contribution		3%		
Government Vesting Contribution				
	YOS			
	0	0%		
	1	4%		
	2	5%		
	3	6%		
	4	7%		
	5	8%		
	6	9%		
	7	10%		
	8	11%		
	9	12%		
	10	13%		
	11	14%		
	12	15%		
	13	16%		
	14	17%		
	15	18%		
	16	19%		
	17	20%		
	18	21%		
	19	22%		
	20	23%		
	21	24%		
	22	25%		
	23	26%		
	24	27%		
	25	28%		
	26	29%		
	27	30%		
	28	31%		
	29	32%		
	30	33%		

Appendix K: Deterministic Career Retention Bonus Values

DETERMINISTIC CAREER RETENTION BONUS (CRB) RATES OF RETURN & VALUES (30 YEAR RETIREE IN 2001)

YEAR	INVESTMENT FUND					CRB VALUE	CRB RETURN	CAREER RETENTION BONUS = $30,000		CRB REAL RETURN
	G-Fund	F-Fund	C-Fund	S-Fund	I-Fund			INFLATION RATE	CRB REAL VALUE	
1987	$136	$335	$482	-$104	$1,400	$32,251	7.50%	3.66%	$31,153	3.84%
1988	$155	$1,055	$1,735	$728	$1,558	$37,482	16.22%	4.12%	$36,154	12.10%
1989	$176	$2,330	$4,129	$1,003	$611	$45,731	22.01%	4.81%	$43,928	17.20%
1990	$214	$1,708	-$419	-$583	-$1,454	$45,196	-1.17%	5.39%	$42,731	-6.56%
1991	$194	$3,114	$4,760	$2,406	$874	$56,545	25.11%	4.22%	$54,638	20.89%
1992	$214	$1,732	$1,339	$709	-$980	$59,558	5.33%	3.01%	$57,856	2.32%
1993	$191	$2,429	$1,887	$928	$3,399	$68,392	14.83%	2.98%	$66,617	11.85%
1994	$258	-$788	$272	-$180	$824	$68,779	0.56%	2.60%	$67,000	-2.04%
1995	$252	$5,534	$9,239	$2,691	$1,225	$87,720	27.54%	2.76%	$85,822	24.78%
1996	$308	$1,295	$6,720	$1,632	$831	$98,506	12.30%	2.96%	$95,910	9.34%
1997	$346	$3,975	$11,515	$2,851	$231	$117,423	19.20%	2.35%	$115,108	16.85%
1998	$348	$4,248	$11,497	$1,054	$3,883	$138,454	17.91%	1.51%	$136,681	16.40%
1999	$429	-$452	$9,633	$5,797	$6,282	$160,143	15.67%	2.21%	$157,083	13.46%
2000	$529	$7,860	-$4,194	-$2,351	-$3,191	$158,797	-0.84%	3.38%	$153,384	-4.22%
2001	$436	$5,573	-$5,366	-$1,420	-$4,634	$153,387	-3.41%	2.86%	$148,845	-6.27%
				Compound Annual Rate of Return			11.49%	Compound Annual Real Rate of Return		8.21%

DETERMINISTIC CAREER RETENTION BONUS (CRB) RATES OF RETURN & VALUES (20 YEAR RETIREE IN 2001)

YEAR	INVESTMENT FUND					CRB VALUE	CRB RETURN	CAREER RETENTION BONUS = $30,000		CRB REAL RETURN
	G-Fund	F-Fund	C-Fund	S-Fund	I-Fund			INFLATION RATE	CRB REAL VALUE	
1997	$105	$1,211	$3,507	$868	$70	$35,761	19.20%	2.35%	$35,056	16.85%
1998	$106	$1,294	$3,501	$321	$1,183	$42,166	17.91%	1.51%	$41,626	16.40%
1999	$131	-$138	$2,934	$1,766	$1,913	$48,772	15.67%	2.21%	$47,840	13.46%
2000	$161	$2,394	-$1,277	-$716	-$972	$48,361	-0.84%	3.38%	$46,713	-4.22%
2001	$133	$1,697	-$1,634	-$432	-$1,411	$46,714	-3.41%	2.86%	$45,331	-6.27%
				Compound Annual Rate of Return			9.26%	Compound Annual Real Rate of Return		6.74%

Appendix L: Simulation Report

Forecast: Option #1 30 YOS Officer TSP Real Value

Summary:
> Display Range is from $2,578,507.11 to $15,166,615.54 $
> Entire Range is from $2,117,956.29 to $28,673,500.98 $
> After 10,000 Trials, the Std. Error of the Mean is $28,637.08

Statistics:

Statistics:	Value
Trials	10000
Mean	$7,535,047.52
Median	$6,920,096.19
Mode	---
Standard Deviation	$2,863,708.49
Variance	8.20E+12
Skewness	1.58
Kurtosis	7.16
Coeff. of Variability	0.38
Range Minimum	$2,117,956.29
Range Maximum	$28,673,500.98
Range Width	$26,555,544.68
Mean Std. Error	$28,637.08
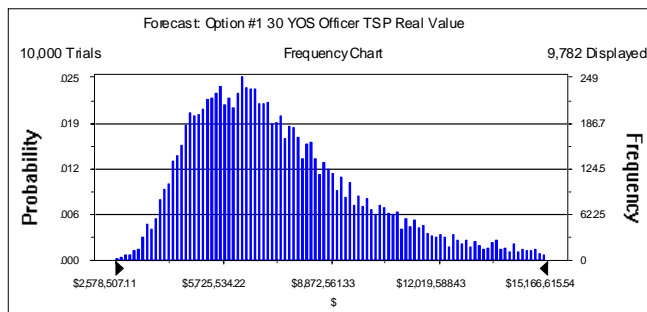
Percentiles:

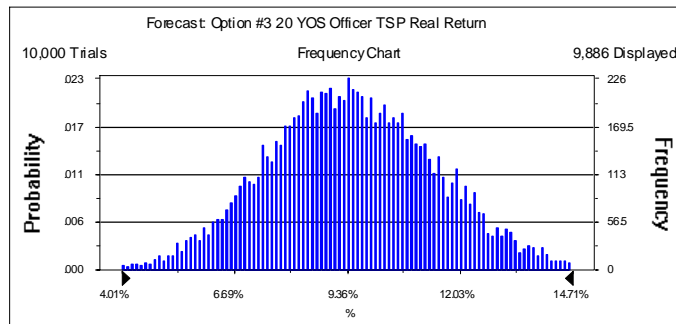| Percentile	$
0%	$2,117,956.29
10%	$4,619,386.70
20%	$5,251,239.46
30%	$5,805,972.12
40%	$6,370,890.22
50%	$6,920,096.19
60%	$7,568,310.66
70%	$8,333,535.72
80%	$9,409,830.53
90%	$11,196,745.43
100%	$28,673,500.98

Forecast: Option #1 30 YOS Officer TSP Real Return

Summary:
Display Range is from 4.77% to 14.67% %
Entire Range is from 2.63% to 17.07% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.76%
Median	9.67%
Mode	---
Standard Deviation	1.83%
Variance	0.03%
Skewness	0.21
Kurtosis	3.04
Coeff. of Variability	0.19
Range Minimum	2.63%
Range Maximum	17.07%
Range Width	14.44%
Mean Std. Error	0.02%

Forecast: Option #1 30 YOS Officer TSP Real Return
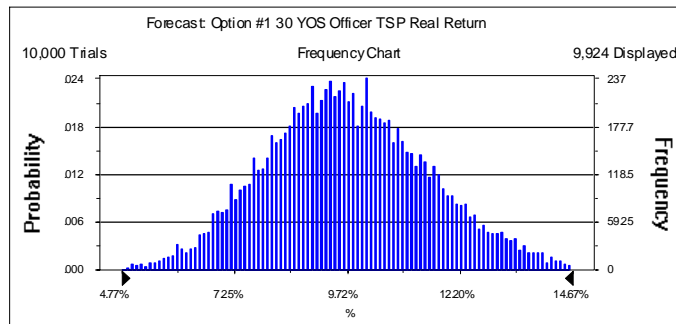
Percentiles:

Percentile	%
0%	2.63%
10%	7.47%
20%	8.21%
30%	8.76%
40%	9.23%
50%	9.67%
60%	10.14%
70%	10.66%
80%	11.28%
90%	12.16%
100%	17.07%

Forecast: Option #1 20 YOS Officer TSP Real Value

Summary:
    Display Range is from $729,106.23 to $2,368,915.01 $
    Entire Range is from $649,125.38 to $4,105,966.10 $
    After 10,000 Trials, the Std. Error of the Mean is $3,536.65

Statistics:	Value
Trials	10000
Mean	$1,451,225.06
Median	$1,394,281.97
Mode	---
Standard Deviation	$353,665.36
Variance	1.25E+11
Skewness	1.15
Kurtosis	5.67
Coeff. of Variability	0.24
Range Minimum	$649,125.38
Range Maximum	$4,105,966.10
Range Width	$3,456,840.72
Mean Std. Error	$3,536.65

Forecast: Option #1 20 YOS Officer TSP Real Value
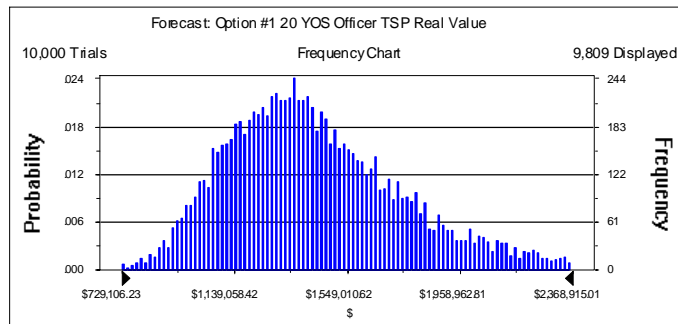
Percentiles:

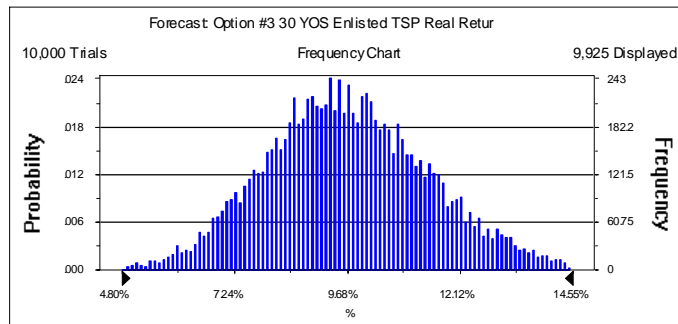| Percentile	$
0%	$649,125.38
10%	$1,059,929.49
20%	$1,160,318.43
30%	$1,245,594.79
40%	$1,321,274.16
50%	$1,394,281.97
60%	$1,475,830.35
70%	$1,576,009.68
80%	$1,706,907.19
90%	$1,908,093.20
100%	$4,105,966.10

Forecast: Option #1 20 YOS Officer TSP Real Return

Summary:
    Display Range is from 4.00% to 14.76% %
    Entire Range is from 0.42% to 17.35% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.53%
Median	9.45%
Mode	---
Standard Deviation	2.06%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.22
Range Minimum	0.42%
Range Maximum	17.35%
Range Width	16.93%
Mean Std. Error	0.02%

Percentiles:

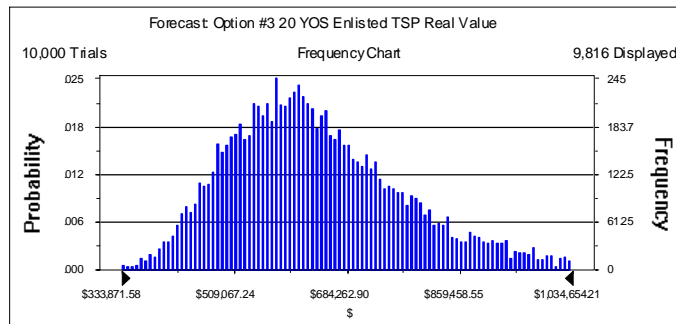| Percentile	%
0%	0.42%
10%	6.95%
20%	7.80%
30%	8.41%
40%	8.94%
50%	9.45%
60%	9.99%
70%	10.58%
80%	11.25%
90%	12.19%
100%	17.35%

Forecast: Option #1 30 YOS Enlisted TSP Real Value

Summary:
   Display Range is from $1,389,436.08 to $8,011,858.21 $
   Entire Range is from $1,143,133.26 to $15,025,095.38 $
   After 10,000 Trials, the Std. Error of the Mean is $15,026.19

Statistics:	Value
Trials	10000
Mean	$4,009,483.43
Median	$3,688,316.16
Mode	---
Standard Deviation	$1,502,618.75
Variance	2.26E+12
Skewness	1.56
Kurtosis	7.08
Coeff. of Variability	0.37
Range Minimum	$1,143,133.26
Range Maximum	$15,025,095.38
Range Width	$13,881,962.12
Mean Std. Error	$15,026.19

Forecast: Option #1 30 YOS Enlisted TSP Real Value
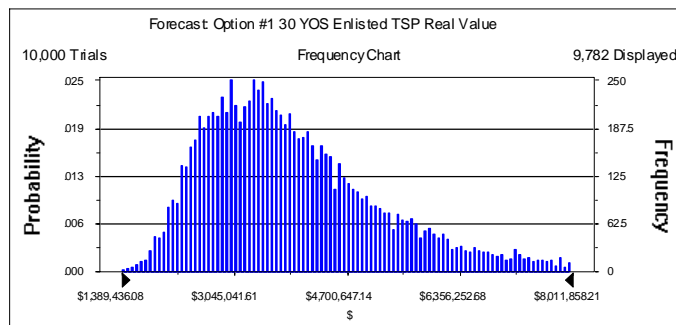
Percentiles:

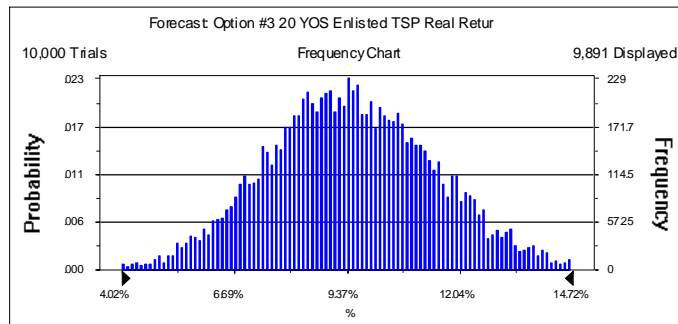| Percentile	$
0%	$1,143,133.26
10%	$2,473,361.01
20%	$2,808,255.85
30%	$3,101,572.14
40%	$3,400,242.28
50%	$3,688,316.16
60%	$4,027,019.75
70%	$4,432,069.23
80%	$4,992,924.94
90%	$5,924,842.45
100%	$15,025,095.38

Forecast: Option #1 30 YOS Enlisted TSP Real Return

Summary:
Display Range is from 4.78% to 14.65% %
Entire Range is from 2.64% to 17.07% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.75%
Median	9.67%
Mode	---
Standard Deviation	1.82%
Variance	0.03%
Skewness	0.21
Kurtosis	3.05
Coeff. of Variability	0.19
Range Minimum	2.64%
Range Maximum	17.07%
Range Width	14.44%
Mean Std. Error	0.02%

Forecast: Option #1 30 YOS Enlisted TSP Real Retur
10,000 Trials   Frequency Chart   9,924 Displayed
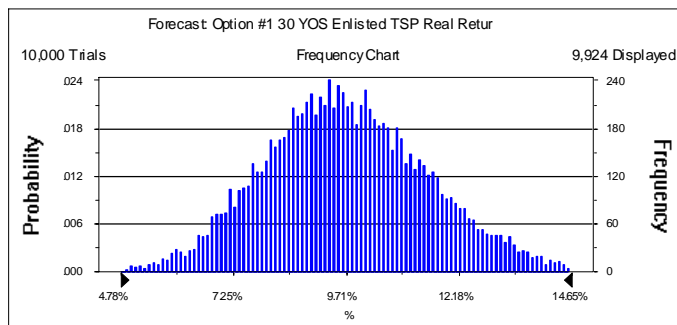
Percentiles:

Percentile	%
0%	2.64%
10%	7.47%
20%	8.20%
30%	8.75%
40%	9.22%
50%	9.67%
60%	10.14%
70%	10.65%
80%	11.26%
90%	12.14%
100%	17.07%

Forecast: Option #1 20 YOS Enlisted TSP Real Value

Summary:
    Display Range is from $387,684.86 to $1,240,860.30 $
    Entire Range is from $346,941.52 to $2,130,785.14 $
    After 10,000 Trials, the Std. Error of the Mean is $1,836.98

Statistics:	Value
Trials	10000
Mean	$764,251.36
Median	$735,131.81
Mode	---
Standard Deviation	$183,698.42
Variance	$33,745,108,927.50
Skewness	1.14
Kurtosis	5.63
Coeff. of Variability	0.24
Range Minimum	$346,941.52
Range Maximum	$2,130,785.14
Range Width	$1,783,843.62
Mean Std. Error	$1,836.98

Forecast: Option #1 20 YOS Enlisted TSP Real Value
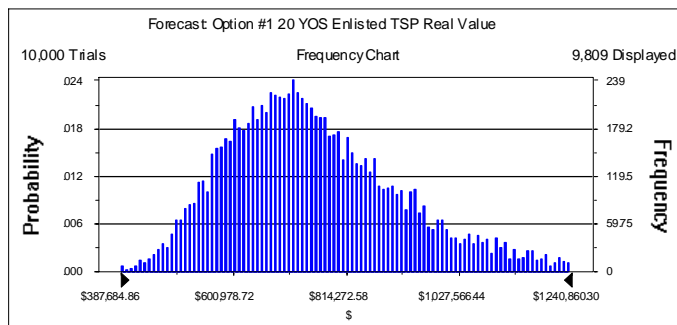
Percentiles:

Percentile	$
0%	$346,941.52
10%	$560,689.88
20%	$612,968.55
30%	$657,422.27
40%	$696,961.65
50%	$735,131.81
60%	$777,445.87
70%	$829,189.66
80%	$897,100.99
90%	$1,000,597.13
100%	$2,130,785.14

Forecast: Option #1 20 YOS Enlisted TSP Real Return

Summary:
Display Range is from 4.00% to 14.77% %
Entire Range is from 0.42% to 17.35% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.52%
Median	9.45%
Mode	---
Standard Deviation	2.05%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.22
Range Minimum	0.42%
Range Maximum	17.35%
Range Width	16.93%
Mean Std. Error	0.02%

Forecast: Option #1 20 YOS Enlisted TSP Real Retur

Percentiles:

Percentile	%
0%	0.42%
10%	6.96%
20%	7.79%
30%	8.40%
40%	8.93%
50%	9.45%
60%	9.98%
70%	10.58%
80%	11.24%
90%	12.19%
100%	17.35%

Forecast: Option #2 30 YOS Officer TSP Real Value

Summary:
Display Range is from $1,850,446.68 to $9,637,183.98 $
Entire Range is from $1,579,658.93 to $17,798,499.52 $
After 10,000 Trials, the Std. Error of the Mean is $17,552.06

Statistics:	Value
Trials	10000
Mean	$4,963,343.73
Median	$4,595,165.86
Mode	---
Standard Deviation	$1,755,205.51
Variance	3.08E+12
Skewness	1.54
Kurtosis	7.01
Coeff. of Variability	0.35
Range Minimum	$1,579,658.93
Range Maximum	$17,798,499.52
Range Width	$16,218,840.59
Mean Std. Error	$17,552.06

Forecast: Option #2 30 YOS Officer TSP Real Value
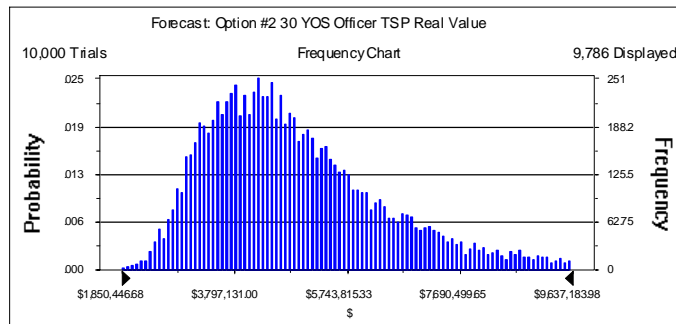
Percentiles:

Percentile	$
0%	$1,579,658.93
10%	$3,157,494.36
20%	$3,558,035.66
30%	$3,910,470.76
40%	$4,254,583.20
50%	$4,595,165.86
60%	$4,992,878.01
70%	$5,460,699.56
80%	$6,114,276.48
90%	$7,207,095.81
100%	$17,798,499.52

Forecast: Option #2 30 YOS Officer TSP Real Return

Summary:
Display Range is from 4.78% to 14.63% %
Entire Range is from 2.65% to 17.05% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.74%
Median	9.66%
Mode	---
Standard Deviation	1.82%
Variance	0.03%
Skewness	0.21
Kurtosis	3.05
Coeff. of Variability	0.19
Range Minimum	2.65%
Range Maximum	17.05%
Range Width	14.40%
Mean Std. Error	0.02%

Forecast: Option #2 30 YOS Officer TSP Real Return
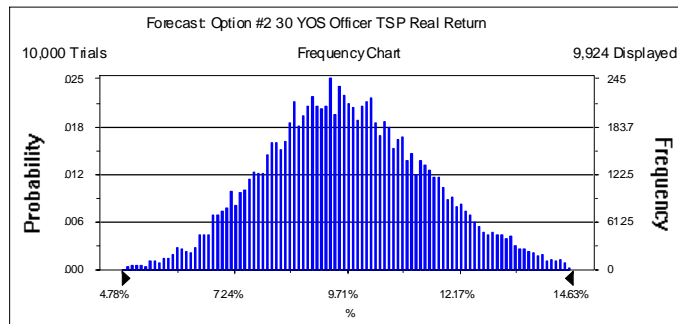
Percentiles:

Percentile	%
0%	2.65%
10%	7.46%
20%	8.20%
30%	8.75%
40%	9.21%
50%	9.66%
60%	10.13%
70%	10.63%
80%	11.26%
90%	12.13%
100%	17.05%

Forecast: Option #2 20 YOS Officer TSP Real Value

Summary:
    Display Range is from $437,463.74 to $1,421,349.01 $
    Entire Range is from $389,475.23 to $2,463,579.66 $
    After 10,000 Trials, the Std. Error of the Mean is $2,121.99

Statistics:	Value
Trials	10000
Mean	$870,735.04
Median	$836,569.18
Mode	---
Standard Deviation	$212,199.22
Variance	$45,028,506,960.99
Skewness	1.15
Kurtosis	5.67
Coeff. of Variability	0.24
Range Minimum	$389,475.23
Range Maximum	$2,463,579.66
Range Width	$2,074,104.43
Mean Std. Error	$2,121.99

Forecast: Option #2 20 YOS Officer TSP Real Value
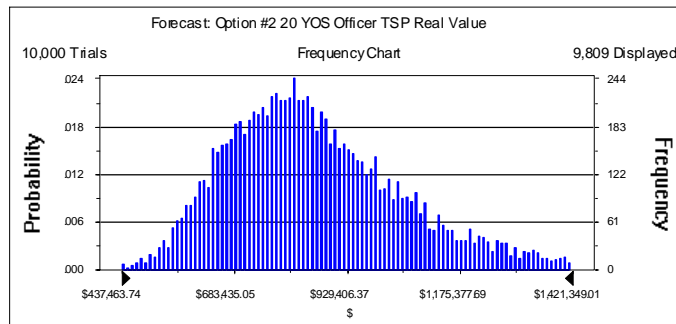
Percentiles:

Percentile	$
0%	$389,475.23
10%	$635,957.69
20%	$696,191.06
30%	$747,356.88
40%	$792,764.49
50%	$836,569.18
60%	$885,498.21
70%	$945,605.81
80%	$1,024,144.31
90%	$1,144,855.92
100%	$2,463,579.66

Forecast: Option #2 20 YOS Officer TSP Real Return

Summary:
Display Range is from 4.00% to 14.76% %
Entire Range is from 0.42% to 17.35% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.53%
Median	9.45%
Mode	---
Standard Deviation	2.06%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.22
Range Minimum	0.42%
Range Maximum	17.35%
Range Width	16.93%
Mean Std. Error	0.02%

Percentiles:

Percentile	%
0%	0.42%
10%	6.95%
20%	7.80%
30%	8.41%
40%	8.94%
50%	9.45%
60%	9.99%
70%	10.58%
80%	11.25%
90%	12.19%
100%	17.35%

Forecast: Option #2 30 YOS Enlisted TSP Real Value

Summary:
Display Range is from $998,374.59 to $5,106,309.63 $
Entire Range is from $853,277.62 to $9,346,911.49 $
After 10,000 Trials, the Std. Error of the Mean is $9,230.63

Statistics:	Value
Trials	10000
Mean	$2,649,534.87
Median	$2,458,325.33
Mode	---
Standard Deviation	$923,063.45
Variance	8.52E+11
Skewness	1.52
Kurtosis	6.92
Coeff. of Variability	0.35
Range Minimum	$853,277.62
Range Maximum	$9,346,911.49
Range Width	$8,493,633.87
Mean Std. Error	$9,230.63

Forecast: Option #2 30 YOS Enlisted TSP Real Value
10,000 Trials — Frequency Chart — 9,787 Displayed
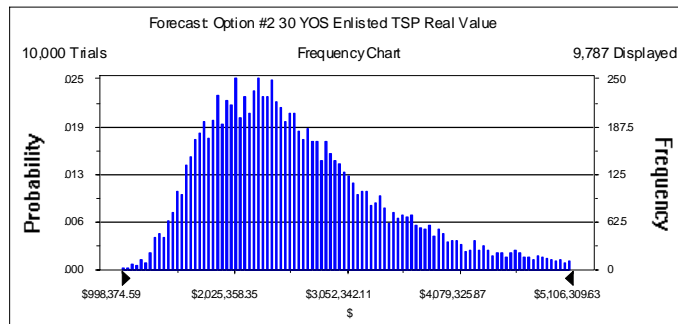
Percentiles:

Percentile	$
0%	$853,277.62
10%	$1,695,544.43
20%	$1,908,766.38
30%	$2,096,103.00
40%	$2,277,323.47
50%	$2,458,325.33
60%	$2,667,598.24
70%	$2,914,577.39
80%	$3,254,203.76
90%	$3,828,580.13
100%	$9,346,911.49

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Forecast: Option #2 30 YOS Enlisted TSP Real Return

Summary:
    Display Range is from 4.79% to 14.61% %
    Entire Range is from 2.65% to 17.04% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.73%
Median	9.65%
Mode	---
Standard Deviation	1.81%
Variance	0.03%
Skewness	0.21
Kurtosis	3.05
Coeff. of Variability	0.19
Range Minimum	2.65%
Range Maximum	17.04%
Range Width	14.39%
Mean Std. Error	0.02%

Forecast: Option #2 30 YOS Enlisted TSP Real Retur
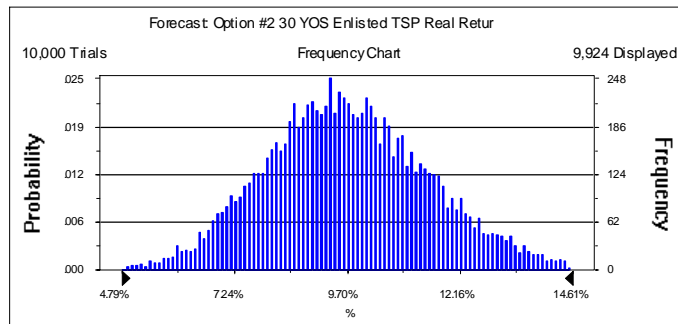
Percentiles:

Percentile	%
0%	2.65%
10%	7.46%
20%	8.19%
30%	8.74%
40%	9.21%
50%	9.65%
60%	10.12%
70%	10.62%
80%	11.25%
90%	12.12%
100%	17.04%

Forecast: Option #2 20 YOS Enlisted TSP Real Value

Summary:
Display Range is from $232,610.92 to $744,516.18 $
Entire Range is from $208,164.91 to $1,278,471.08 $
After 10,000 Trials, the Std. Error of the Mean is $1,102.19

Statistics:	Value
Trials	10000
Mean	$458,550.81
Median	$441,079.09
Mode	---
Standard Deviation	$110,219.05
Variance	$12,148,239,213.90
Skewness	1.14
Kurtosis	5.63
Coeff. of Variability	0.24
Range Minimum	$208,164.91
Range Maximum	$1,278,471.08
Range Width	$1,070,306.17
Mean Std. Error	$1,102.19

Forecast: Option #2 20 YOS Enlisted TSP Real Value

10,000 Trials — Frequency Chart — 9,809 Displayed
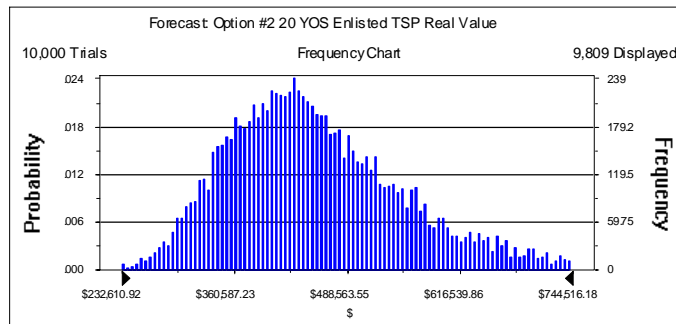
Percentiles:

Percentile	$
0%	$208,164.91
10%	$336,413.93
20%	$367,781.13
30%	$394,453.36
40%	$418,176.99
50%	$441,079.09
60%	$466,467.52
70%	$497,513.80
80%	$538,260.60
90%	$600,358.28
100%	$1,278,471.08

Forecast: Option #2 20 YOS Enlisted TSP Real Return

Summary:
    Display Range is from 4.00% to 14.77% %
    Entire Range is from 0.42% to 17.35% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.52%
Median	9.45%
Mode	---
Standard Deviation	2.05%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.22
Range Minimum	0.42%
Range Maximum	17.35%
Range Width	16.93%
Mean Std. Error	0.02%

Forecast: Option #2 20 YOS Enlisted TSP Real Retur

Percentiles:

Percentile	%
0%	0.42%
10%	6.96%
20%	7.79%
30%	8.40%
40%	8.93%
50%	9.45%
60%	9.98%
70%	10.58%
80%	11.24%
90%	12.19%
100%	17.35%

Forecast: Option #3 30 YOS Officer TSP Real Value

Summary:
　　Display Range is from $2,676,058.65 to $13,469,048.09 $
　　Entire Range is from $2,279,543.72 to $24,527,645.11 $
　　After 10,000 Trials, the Std. Error of the Mean is $24,261.28

Statistics:	Value
Trials	10000
Mean	$7,019,554.73
Median	$6,513,776.13
Mode	---
Standard Deviation	$2,426,128.06
Variance	5.89E+12
Skewness	1.51
Kurtosis	6.87
Coeff. of Variability	0.35
Range Minimum	$2,279,543.72
Range Maximum	$24,527,645.11
Range Width	$22,248,101.40
Mean Std. Error	$24,261.28
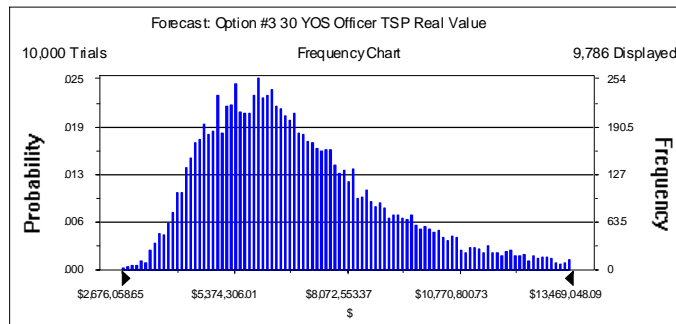
Percentiles:

Percentile	$
0%	$2,279,543.72
10%	$4,509,252.97
20%	$5,069,710.62
30%	$5,564,238.72
40%	$6,047,226.65
50%	$6,513,776.13
60%	$7,069,829.19
70%	$7,715,458.36
80%	$8,618,765.31
90%	$10,126,706.83
100%	$24,527,645.11

Forecast: Option #3 30 YOS Officer TSP Real Return

Summary:
Display Range is from 4.79% to 14.58% %
Entire Range is from 2.65% to 16.94% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.72%
Median	9.64%
Mode	---
Standard Deviation	1.80%
Variance	0.03%
Skewness	0.21
Kurtosis	3.05
Coeff. of Variability	0.19
Range Minimum	2.65%
Range Maximum	16.94%
Range Width	14.29%
Mean Std. Error	0.02%
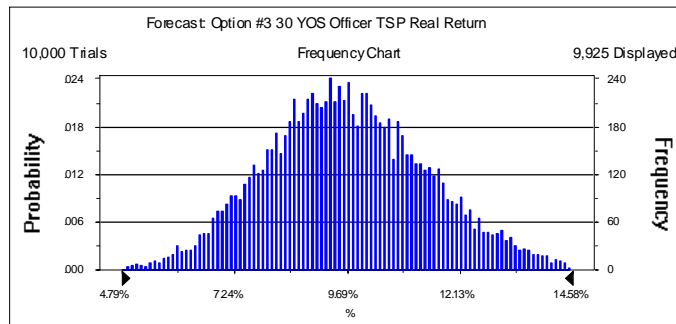
Percentiles:

Percentile	%
0%	2.65%
10%	7.46%
20%	8.19%
30%	8.73%
40%	9.20%
50%	9.64%
60%	10.10%
70%	10.60%
80%	11.23%
90%	12.09%
100%	16.94%

Forecast: Option #3 20 YOS Officer TSP Real Value

Summary:
Display Range is from $626,671.22 to $1,972,745.33 $
Entire Range is from $563,284.62 to $3,363,762.88 $
After 10,000 Trials, the Std. Error of the Mean is $2,884.69

Statistics:	Value
Trials	10000
Mean	$1,221,338.80
Median	$1,175,711.24
Mode	---
Standard Deviation	$288,468.57
Variance	$83,214,116,947.27
Skewness	1.12
Kurtosis	5.58
Coeff. of Variability	0.24
Range Minimum	$563,284.62
Range Maximum	$3,363,762.88
Range Width	$2,800,478.25
Mean Std. Error	$2,884.69

Forecast: Option #3 20 YOS Officer TSP Real Value
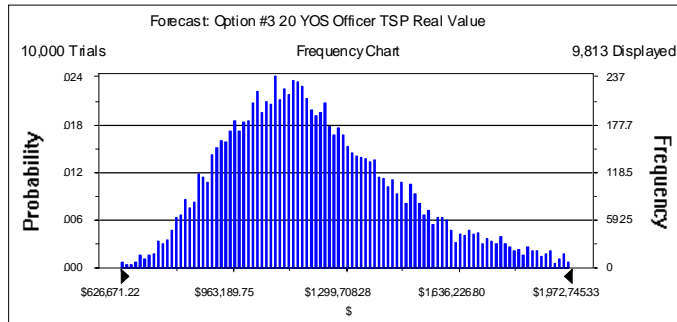
Percentiles:

Percentile	$
0%	$563,284.62
10%	$900,706.33
20%	$982,819.91
30%	$1,053,750.59
40%	$1,116,534.35
50%	$1,175,711.24
60%	$1,242,815.54
70%	$1,325,836.58
80%	$1,431,690.66
90%	$1,594,313.05
100%	$3,363,762.88

Forecast: Option #3 20 YOS Officer TSP Real Return

Summary:
Display Range is from 4.01% to 14.71% %
Entire Range is from 0.43% to 17.30% %
After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.51%
Median	9.44%
Mode	---
Standard Deviation	2.04%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.21
Range Minimum	0.43%
Range Maximum	17.30%
Range Width	16.86%
Mean Std. Error	0.02%

Forecast: Option #3 20 YOS Officer TSP Real Return
10,000 Trials — Frequency Chart — 9,886 Displayed

Percentiles:

Percentile	%
0%	0.43%
10%	6.95%
20%	7.79%
30%	8.40%
40%	8.92%
50%	9.44%
60%	9.96%
70%	10.55%
80%	11.22%
90%	12.16%
100%	17.30%

Forecast: Option #3 30 YOS Enlisted TSP Real Value

Summary:
   Display Range is from $1,233,375.42 to $7,059,253.94 $
   Entire Range is from $1,233,375.42 to $13,031,138.68 $
   After 10,000 Trials, the Std. Error of the Mean is $12,779.39

Statistics:	Value
Trials	10000
Mean	$3,754,084.95
Median	$3,491,080.36
Mode	---
Standard Deviation	$1,277,939.09
Variance	1.63E+12
Skewness	1.49
Kurtosis	6.78
Coeff. of Variability	0.34
Range Minimum	$1,233,375.42
Range Maximum	$13,031,138.68
Range Width	$11,797,763.26
Mean Std. Error	$12,779.39

Forecast Option #3 30 YOS Enlisted TSP Real Value

10,000 Trials — Frequency Chart — 9,767 Displayed
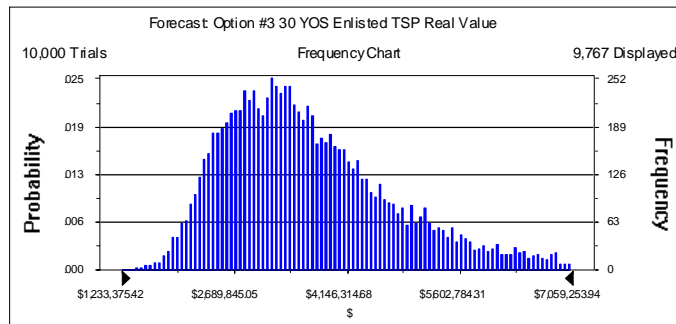
Percentiles:

Percentile	$
0%	$1,233,375.42
10%	$2,426,831.93
20%	$2,723,307.01
30%	$2,989,110.03
40%	$3,241,917.14
50%	$3,491,080.36
60%	$3,782,912.82
70%	$4,125,847.98
80%	$4,602,720.89
90%	$5,392,726.07
100%	$13,031,138.68

Forecast: Option #3 30 YOS Enlisted TSP Real Return

Summary:
    Display Range is from 4.80% to 14.55% %
    Entire Range is from 2.65% to 16.94% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.71%
Median	9.63%
Mode	---
Standard Deviation	1.80%
Variance	0.03%
Skewness	0.21
Kurtosis	3.05
Coeff. of Variability	0.19
Range Minimum	2.65%
Range Maximum	16.94%
Range Width	14.29%
Mean Std. Error	0.02%

Forecast: Option #3 30 YOS Enlisted TSP Real Retur

Percentiles:

Percentile	%
0%	2.65%
10%	7.45%
20%	8.19%
30%	8.73%
40%	9.19%
50%	9.63%
60%	10.09%
70%	10.59%
80%	11.22%
90%	12.08%
100%	16.94%

Forecast: Option #3 20 YOS Enlisted TSP Real Value

Summary:
Display Range is from $333,871.58 to $1,034,654.21 $
Entire Range is from $301,680.29 to $1,746,833.26 $
After 10,000 Trials, the Std. Error of the Mean is $1,499.00

Statistics:	Value
Trials	10000
Mean	$644,189.80
Median	$620,877.05
Mode	---
Standard Deviation	$149,899.52
Variance	$22,469,866,675.44
Skewness	1.10
Kurtosis	5.53
Coeff. of Variability	0.23
Range Minimum	$301,680.29
Range Maximum	$1,746,833.26
Range Width	$1,445,152.97
Mean Std. Error	$1,499.00

Forecast Option #3 20 YOS Enlisted TSP Real Value

Percentiles:

Percentile	$
0%	$301,680.29
10%	$477,356.70
20%	$520,280.34
30%	$557,123.23
40%	$589,799.04
50%	$620,877.05
60%	$655,810.62
70%	$698,560.82
80%	$753,703.75
90%	$838,361.50
100%	$1,746,833.26

Forecast: Option #3 20 YOS Enlisted TSP Real Return

Summary:
    Display Range is from 4.02% to 14.72% %
    Entire Range is from 0.43% to 17.29% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.50%
Median	9.44%
Mode	---
Standard Deviation	2.04%
Variance	0.04%
Skewness	0.17
Kurtosis	3.10
Coeff. of Variability	0.21
Range Minimum	0.43%
Range Maximum	17.29%
Range Width	16.86%
Mean Std. Error	0.02%

Percentiles:

Percentile	%
0%	0.43%
10%	6.95%
20%	7.79%
30%	8.39%
40%	8.92%
50%	9.44%
60%	9.96%
70%	10.55%
80%	11.21%
90%	12.15%
100%	17.29%

Forecast: CRB Real Value 30 YOS Retiree in 2032

Summary:
Display Range is from $102,856 to $479,147 $
Entire Range is from $98,054 to $703,931 $
After 10,000 Trials, the Std. Error of the Mean is $746

Statistics:	Value
Trials	10000
Mean	$287,484
Median	$278,555
Mode	---
Standard Deviation	$74,645
Variance	$5,571,882,408
Skewness	0.77
Kurtosis	4.12
Coeff. of Variability	0.26
Range Minimum	$98,054
Range Maximum	$703,931
Range Width	$605,876
Mean Std. Error	$746.45

Forecast: CRB Real Value 30 YOS Retiree in 2032
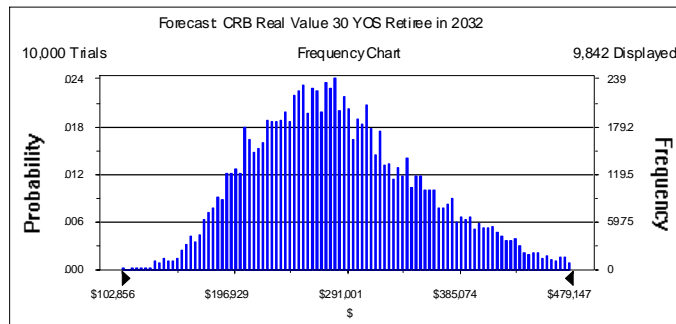
Percentiles:

Percentile	$
0%	$98,054
10%	$199,710
20%	$224,392
30%	$244,433
40%	$261,672
50%	$278,555
60%	$296,689
70%	$317,583
80%	$346,148
90%	$387,870
100%	$703,931

Forecast: CRB Real Return 30 YOS Retiree in 2032

Summary:
    Display Range is from 3.66% to 14.63% %
    Entire Range is from -0.06% to 17.32% %
    After 10,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	10000
Mean	9.06%
Median	9.09%
Mode	---
Standard Deviation	2.10%
Variance	0.04%
Skewness	-0.02
Kurtosis	3.06
Coeff. of Variability	0.23
Range Minimum	-0.06%
Range Maximum	17.32%
Range Width	17.38%
Mean Std. Error	0.02%
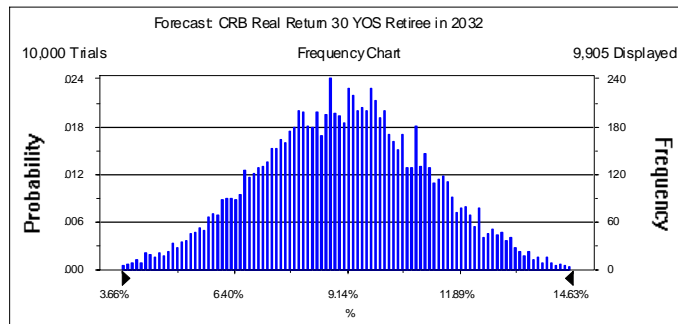
Percentiles:

Percentile	%
0%	-0.06%
10%	6.35%
20%	7.29%
30%	7.96%
40%	8.54%
50%	9.09%
60%	9.61%
70%	10.14%
80%	10.85%
90%	11.75%
100%	17.32%

Forecast: CRB Real Value 20 YOS Retiree in 2022

Summary:
    Display Range is from $45,217 to $102,710 $
    Entire Range is from $41,585 to $126,223 $
    After 10,000 Trials, the Std. Error of the Mean is $113

Statistics:	Value
Trials	10000
Mean	$74,723
Median	$73,982
Mode	---
Standard Deviation	$11,256
Variance	$126,687,631
Skewness	0.39
Kurtosis	3.27
Coeff. of Variability	0.15
Range Minimum	$41,585
Range Maximum	$126,223
Range Width	$84,638
Mean Std. Error	$112.56

Forecast: CRB Real Value 20 YOS Retiree in 2022
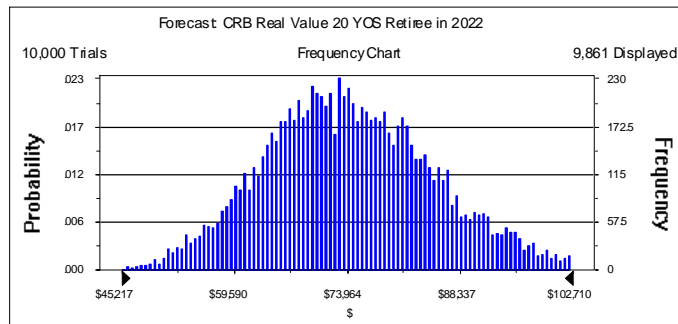
Percentiles:

Percentile	$
0%	$41,585
10%	$60,816
20%	$65,253
30%	$68,316
40%	$71,165
50%	$73,982
60%	$76,881
70%	$80,150
80%	$83,822
90%	$89,487
100%	$126,223

Forecast: CRB Real Return 20 YOS Retiree in 2022

Summary:
Display Range is from -0.16% to 17.82% %
Entire Range is from -4.47% to 23.19% %
After 10,000 Trials, the Std. Error of the Mean is 0.04%

Statistics:	Value
Trials	10000
Mean	9.09%
Median	9.09%
Mode	---
Standard Deviation	3.63%
Variance	0.13%
Skewness	-0.01
Kurtosis	3.00
Coeff. of Variability	0.40
Range Minimum	-4.47%
Range Maximum	23.19%
Range Width	27.66%
Mean Std. Error	0.04%

Forecast: CRB Real Return 20 YOS Retiree in 2022
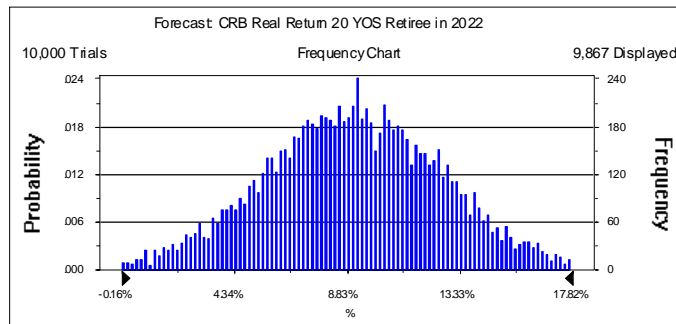
Percentiles:

Percentile	%
0%	-4.47%
10%	4.44%
20%	6.04%
30%	7.21%
40%	8.17%
50%	9.09%
60%	10.00%
70%	10.99%
80%	12.18%
90%	13.69%
100%	23.19%

Assumption: G-Fund 1971

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
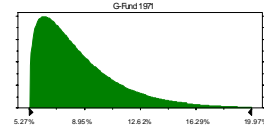
Assumption: G-Fund 1972

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
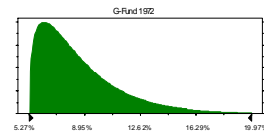
Assumption: G-Fund 1973

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
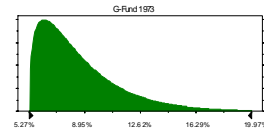
Assumption: G-Fund 1974

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
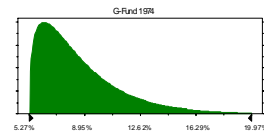
Assumption: G-Fund 1975

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity

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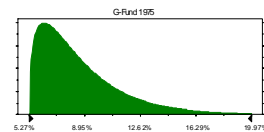
Assumption: G-Fund 1976

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1976

Selected range is from 5.27% to +Infinity
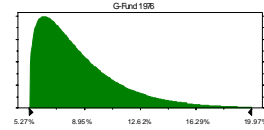
Assumption: G-Fund 1977

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1977

Selected range is from 5.27% to +Infinity
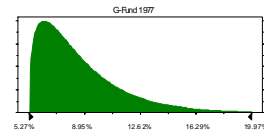
Assumption: G-Fund 1978

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1978

Selected range is from 5.27% to +Infinity
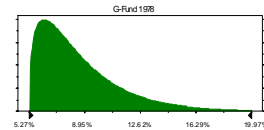
Assumption: G-Fund 1979

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1979

Selected range is from 5.27% to +Infinity
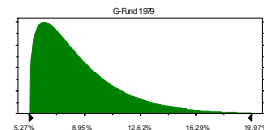
Assumption: G-Fund 1980

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1980

Selected range is from 5.27% to +Infinity
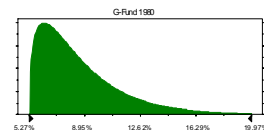
Assumption: G-Fund 1981

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
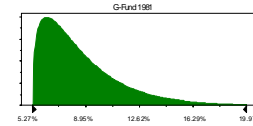
Assumption: G-Fund 1982

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
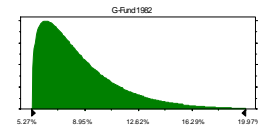
Assumption: G-Fund 1983

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
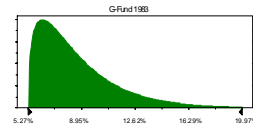
Assumption: G-Fund 1984

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
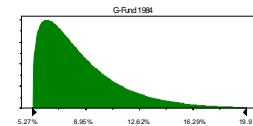
Assumption: G-Fund 1985

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
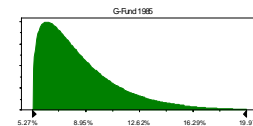
Assumption: G-Fund 1986

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 1986

Selected range is from 5.27% to +Infinity
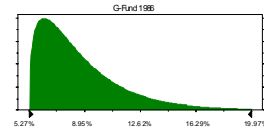
Assumption: G-Fund 1987

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 1987

Selected range is from 5.27% to +Infinity
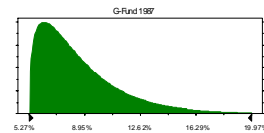
Assumption: G-Fund 1988

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 1988

Selected range is from 5.27% to +Infinity
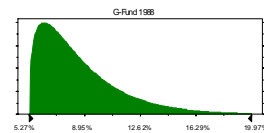
Assumption: G-Fund 1989

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 1989

Selected range is from 5.27% to +Infinity
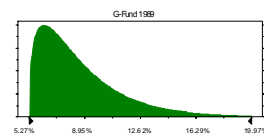
Assumption: G-Fund 1990

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 1990

Selected range is from 5.27% to +Infinity

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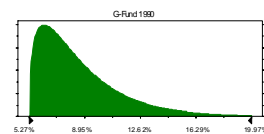
Assumption: G-Fund 1991

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1991

Selected range is from 5.27% to +Infinity
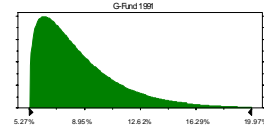
Assumption: G-Fund 1992

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1992

Selected range is from 5.27% to +Infinity
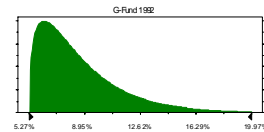
Assumption: G-Fund 1993

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1993

Selected range is from 5.27% to +Infinity
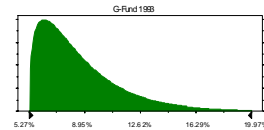
Assumption: G-Fund 1994

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1994

Selected range is from 5.27% to +Infinity
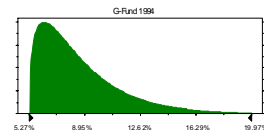
Assumption: G-Fund 1995

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

G-Fund 1995

Selected range is from 5.27% to +Infinity
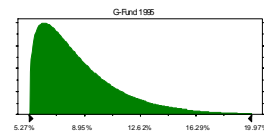
Assumption: G-Fund 1996

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
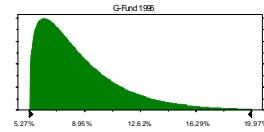
Assumption: G-Fund 1997

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
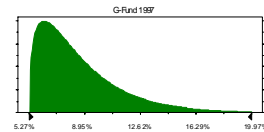
Assumption: G-Fund 1998

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
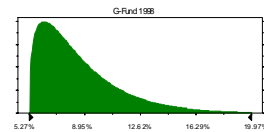
Assumption: G-Fund 1999

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
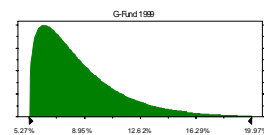
Assumption: G-Fund 2000

Gamma distribution with parameters:
Location   5.27%
Scale   2.44%
Shape   1.380686149

Selected range is from 5.27% to +Infinity
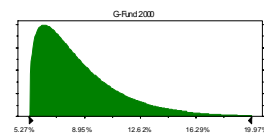
Assumption: G-Fund 2001

Gamma distribution with parameters:
Location	5.27%
Scale	2.44%
Shape	1.380686149

G-Fund 2001

Selected range is from 5.27% to +Infinity
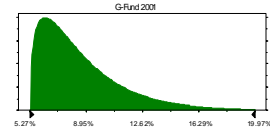
Assumption: F-Fund 1971

Logistic distribution with parameters:
Mean	10.22%
Scale	4.22%

F-Fund 1971

Selected range is from -Infinity to +Infinity
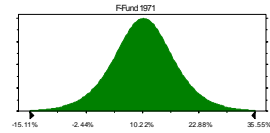
Assumption: F-Fund 1972

Logistic distribution with parameters:
Mean	10.22%
Scale	4.22%

F-Fund 1972

Selected range is from -Infinity to +Infinity
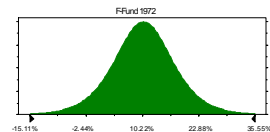
Assumption: F-Fund 1973

Logistic distribution with parameters:
Mean	10.22%
Scale	4.22%

F-Fund 1973

Selected range is from -Infinity to +Infinity
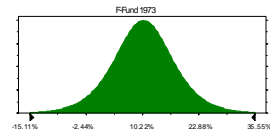
Assumption: F-Fund 1974

Logistic distribution with parameters:
Mean	10.22%
Scale	4.22%

F-Fund 1974

Selected range is from -Infinity to +Infinity

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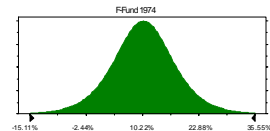
Assumption: F-Fund 1975

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity
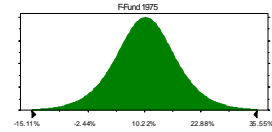
Assumption: F-Fund 1976

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity
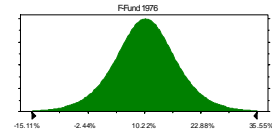
Assumption: F-Fund 1977

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity
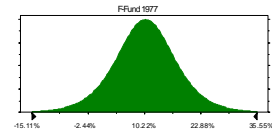
Assumption: F-Fund 1978

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity
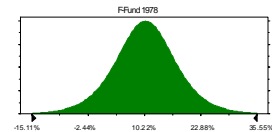
Assumption: F-Fund 1979

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity
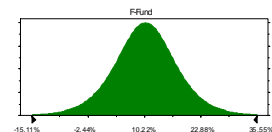
Assumption: F-Fund 1980

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
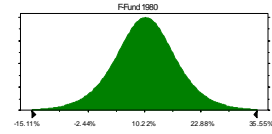
F-Fund 1980

Assumption: F-Fund 1981

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
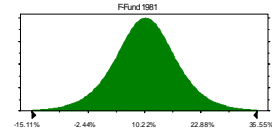
F-Fund 1981

Assumption: F-Fund 1982

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
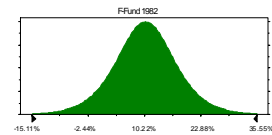
F-Fund 1982

Assumption: F-Fund 1983

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
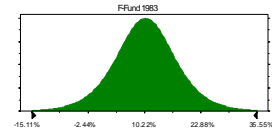
F-Fund 1983

Assumption: F-Fund 1984

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
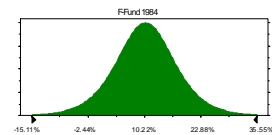
F-Fund 1984

Assumption: F-Fund 1985

 Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

 Selected range is from -Infinity to +Infinity
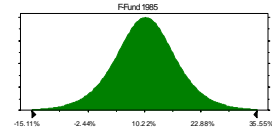
Assumption: F-Fund 1986

 Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

 Selected range is from -Infinity to +Infinity
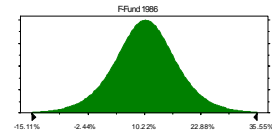
Assumption: F-Fund 1987

 Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

 Selected range is from -Infinity to +Infinity
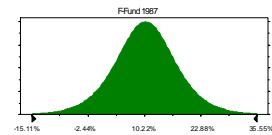
Assumption: F-Fund 1988

 Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

 Selected range is from -Infinity to +Infinity
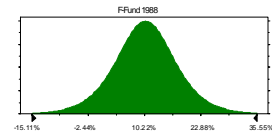
Assumption: F-Fund 1989

 Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

 Selected range is from -Infinity to +Infinity

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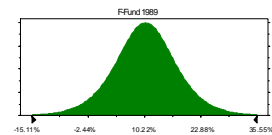
Assumption: F-Fund 1990

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity

F-Fund 1990

-15.11%   -2.44%   10.22%   22.88%   35.55%
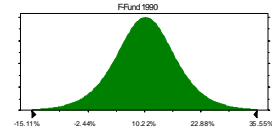
Assumption: F-Fund 1991

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity

F-Fund 1991

-15.11%   -2.44%   10.22%   22.88%   35.55%
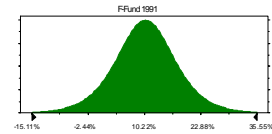
Assumption: F-Fund 1992

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity

F-Fund 1992

-15.11%   -2.44%   10.22%   22.88%   35.55%
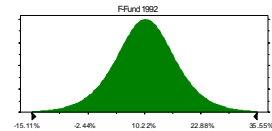
Assumption: F-Fund 1993

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity

F-Fund 1993

-15.11%   -2.44%   10.22%   22.88%   35.55%
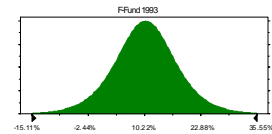
Assumption: F-Fund 1994

Logistic distribution with parameters:
Mean   10.22%
Scale   4.22%

Selected range is from -Infinity to +Infinity

F-Fund 1994

-15.11%   -2.44%   10.22%   22.88%   35.55%

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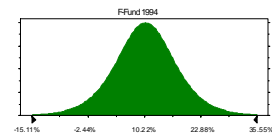
Assumption: F-Fund 1995

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
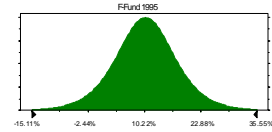
Assumption: F-Fund 1996

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
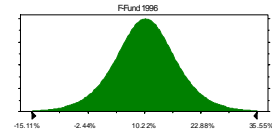
Assumption: F-Fund 1997

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
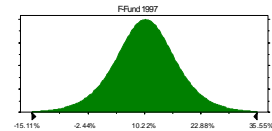
Assumption: F-Fund 1998

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
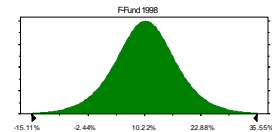
Assumption: F-Fund 1999

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity

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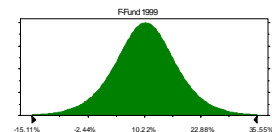
Assumption: F-Fund 2000

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
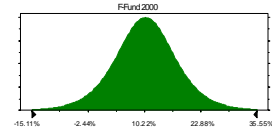
Assumption: F-Fund 2001

   Logistic distribution with parameters:
      Mean   10.22%
      Scale   4.22%

   Selected range is from -Infinity to +Infinity
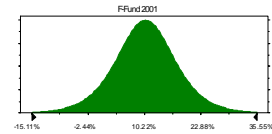
Assumption: C-Fund 1971

   Triangular distribution with parameters:
      Minimum   -23.65%
      Likeliest   31.69%
      Maximum   41.90%

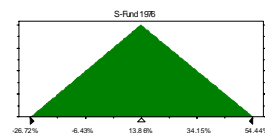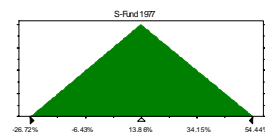   Selected range is from -23.65% to 41.90%
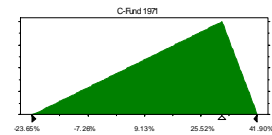
Assumption: C-Fund 1972

   Triangular distribution with parameters:
      Minimum   -23.65%
      Likeliest   31.69%
      Maximum   41.90%

   Selected range is from -23.65% to 41.90%
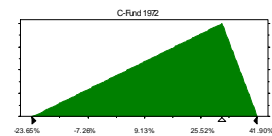
Assumption: C-Fund 1973

   Triangular distribution with parameters:
      Minimum   -23.65%
      Likeliest   31.69%
   Maximum   41.90%

   Selected range is from -23.65% to 41.90%
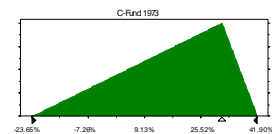
Assumption: C-Fund 1974

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%
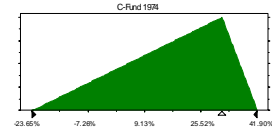
Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1975

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%
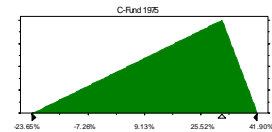
Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1976

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%
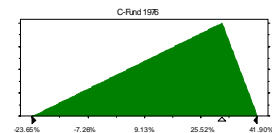
Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1977

Normal distribution with parameters:
Mean	14.31%
Standard Dev.	16.56%
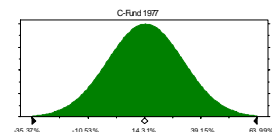
Selected range is from -Infinity to +Infinity

Assumption: C-Fund 1978

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%

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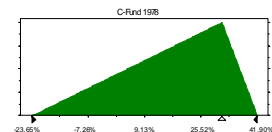
Assumption: C-Fund 1979

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%

Selected range is from -23.65% to 41.90%
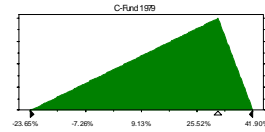
Assumption: C-Fund 1980

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%

Selected range is from -23.65% to 41.90%
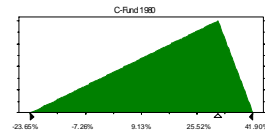
Assumption: C-Fund 1981

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%

Selected range is from -23.65% to 41.90%
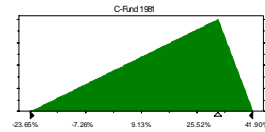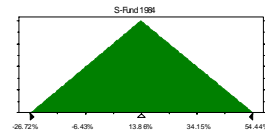

Assumption: C-Fund 1982

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%

Selected range is from -23.65% to 41.90%
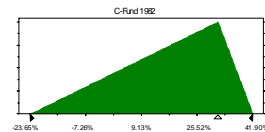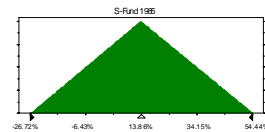

Assumption: C-Fund 1983

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%

Selected range is from -23.65% to 41.90%
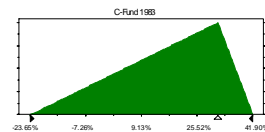
Assumption: C-Fund 1984

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%
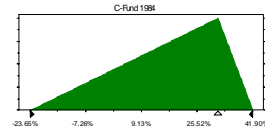
C-Fund 1984

Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1985

Triangular distribution with parameters:
Minimum   -23.65%
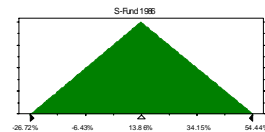Likeliest   31.69%
Maximum   41.90%
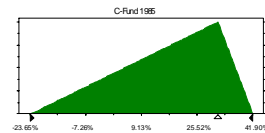
C-Fund 1985

Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1986

Triangular distribution with parameters:
Minimum   -23.65%
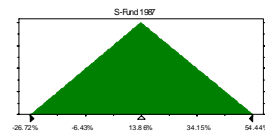Likeliest   31.69%
Maximum   41.90%
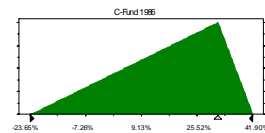
C-Fund 1986

Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1987

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%
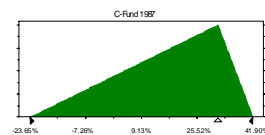
C-Fund 1987

Selected range is from -23.65% to 41.90%
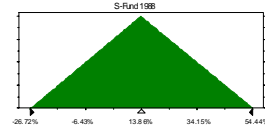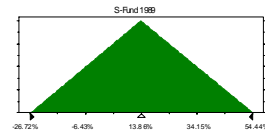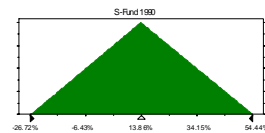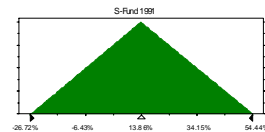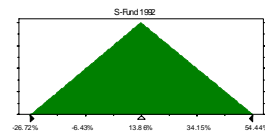

Assumption: C-Fund 1988

Triangular distribution with parameters:
Minimum   -23.65%
Likeliest   31.69%
Maximum   41.90%
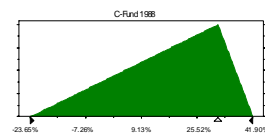
C-Fund 1988

Selected range is from -23.65% to 41.90%

Assumption: C-Fund 1989

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
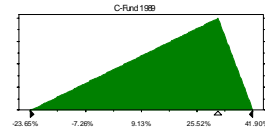
C-Fund 1989

Assumption: C-Fund 1990

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
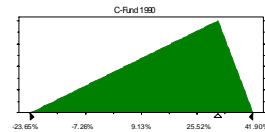
C-Fund 1990

Assumption: C-Fund 1991

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
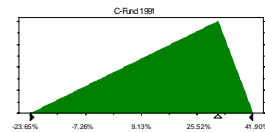
C-Fund 1991

Assumption: C-Fund 1992

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
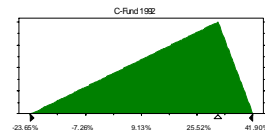
C-Fund 1992

Assumption: C-Fund 1993

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%

C-Fund 1993

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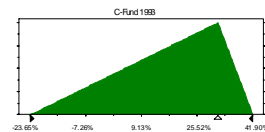
Assumption: C-Fund 1994

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
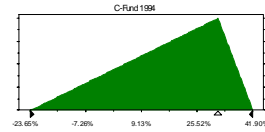
C-Fund 1994

Assumption: C-Fund 1995

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
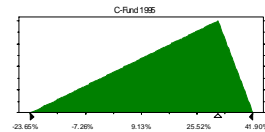
C-Fund 1995

Assumption: C-Fund 1996

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
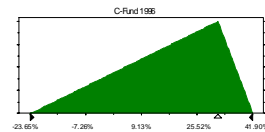
C-Fund 1996

Assumption: C-Fund 1997

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
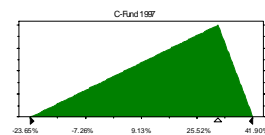
C-Fund 1997

Assumption: C-Fund 1998

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
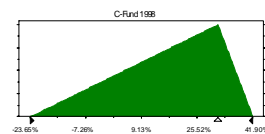
C-Fund 1998

Assumption: C-Fund 1999

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%

C-Fund 1999
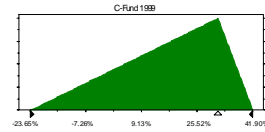
Assumption: C-Fund 2000

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%
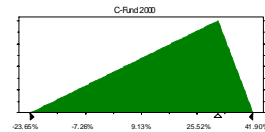
C-Fund 2000

Assumption: C-Fund 2001

Triangular distribution with parameters:
Minimum	-23.65%
Likeliest	31.69%
Maximum	41.90%

Selected range is from -23.65% to 41.90%

C-Fund 2001
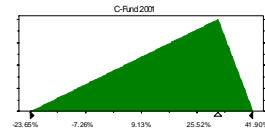
Assumption: S-Fund 1971

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%
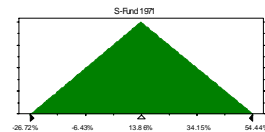
S-Fund 1971

Assumption: S-Fund 1972

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%
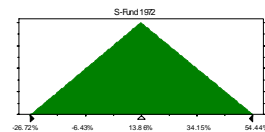
S-Fund 1972

Assumption: S-Fund 1973
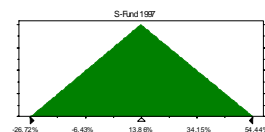
Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1973

Selected range is from -26.72% to 54.44%
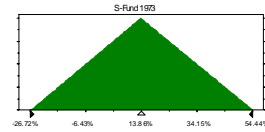
Assumption: S-Fund 1974

Triangular distribution with parameters:
Minimum   -26.72%
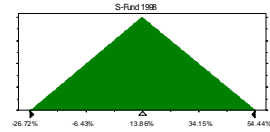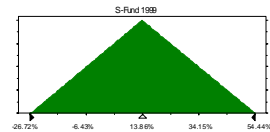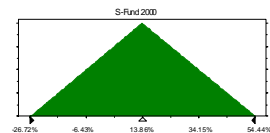Likeliest   13.73%
Maximum   54.44%

S-Fund 1974
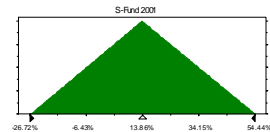
Selected range is from -26.72% to 54.44%
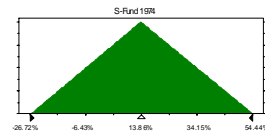
Assumption: S-Fund 1975

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1975

Selected range is from -26.72% to 54.44%
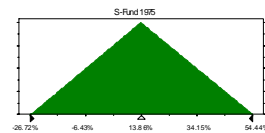
Assumption: S-Fund 1976

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1976

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1977

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1977

Selected range is from -26.72% to 54.44%

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Assumption: S-Fund 1978

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1978

Selected range is from -26.72% to 54.44%
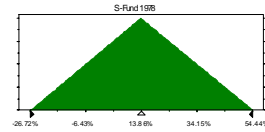
Assumption: S-Fund 1979

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1979

Selected range is from -26.72% to 54.44%
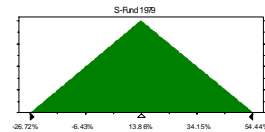
Assumption: S-Fund 1980

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1980

Selected range is from -26.72% to 54.44%
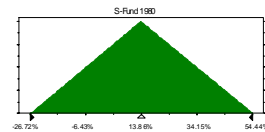
Assumption: S-Fund 1981

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1981

Selected range is from -26.72% to 54.44%
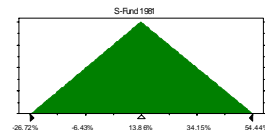
Assumption: S-Fund 1982

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1982

Selected range is from -26.72% to 54.44%

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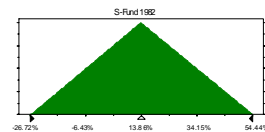
Assumption: S-Fund 1983

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1983

Selected range is from -26.72% to 54.44%
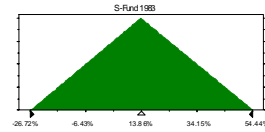
Assumption: S-Fund 1984

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1984

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1985

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1985

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1986

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1986

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1987

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1987

Selected range is from -26.72% to 54.44%

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Assumption: S-Fund 1988

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1989

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1990

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1991

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1992

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

159

Assumption: S-Fund 1993

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1993

Selected range is from -26.72% to 54.44%
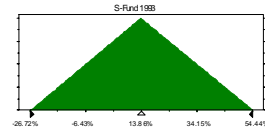
Assumption: S-Fund 1994

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1994

Selected range is from -26.72% to 54.44%
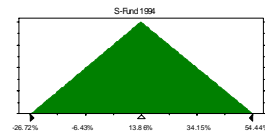
Assumption: S-Fund 1995

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1995

Selected range is from -26.72% to 54.44%
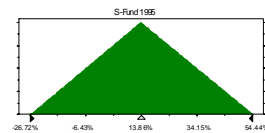
Assumption: S-Fund 1996

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1996

Selected range is from -26.72% to 54.44%
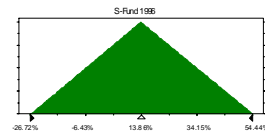
Assumption: S-Fund 1997

Triangular distribution with parameters:
Minimum   -26.72%
Likeliest   13.73%
Maximum   54.44%

S-Fund 1997

Selected range is from -26.72% to 54.44%

160

Assumption: S-Fund 1998

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 1999

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 2000

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: S-Fund 2001

Triangular distribution with parameters:
Minimum	-26.72%
Likeliest	13.73%
Maximum	54.44%

Selected range is from -26.72% to 54.44%

Assumption: I-Fund 1971

Logistic distribution with parameters:
Mean	11.55%
Scale	12.77%

Selected range is from -Infinity to +Infinity

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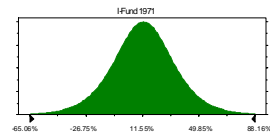
Assumption: I-Fund 1972

    Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

    Selected range is from -Infinity to +Infinity
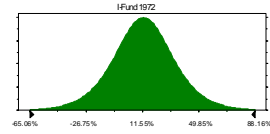
Assumption: I-Fund 1973

    Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

    Selected range is from -Infinity to +Infinity
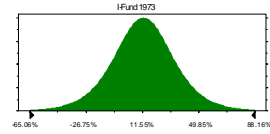
Assumption: I-Fund 1974

    Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

    Selected range is from -Infinity to +Infinity
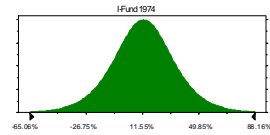
Assumption: I-Fund 1975

    Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

    Selected range is from -Infinity to +Infinity
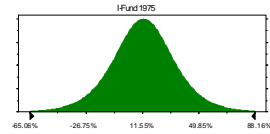
Assumption: I-Fund 1976

    Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

    Selected range is from -Infinity to +Infinity

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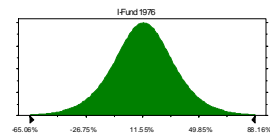
Assumption: I-Fund 1977

   Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

   Selected range is from -Infinity to +Infinity
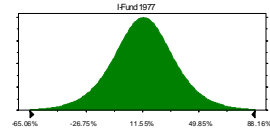
Assumption: I-Fund 1978

   Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

   Selected range is from -Infinity to +Infinity
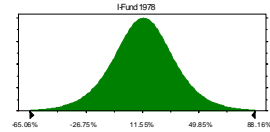
Assumption: I-Fund 1979

   Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

   Selected range is from -Infinity to +Infinity
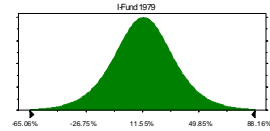
Assumption: I-Fund 1980

   Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

   Selected range is from -Infinity to +Infinity
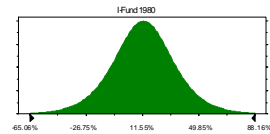
Assumption: I-Fund 1981

   Logistic distribution with parameters:

Mean	11.55%
Scale	12.77%

   Selected range is from -Infinity to +Infinity
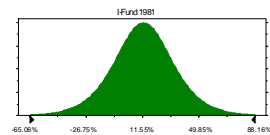
Assumption: I-Fund 1982

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

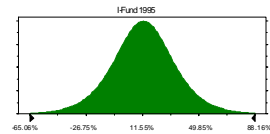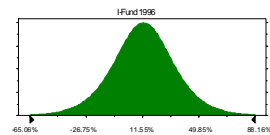Selected range is from -Infinity to +Infinity
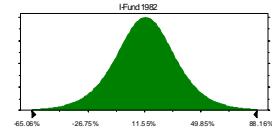
I-Fund 1982

Assumption: I-Fund 1983

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
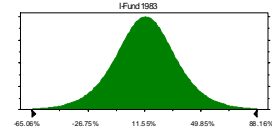
I-Fund 1983

Assumption: I-Fund 1984

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
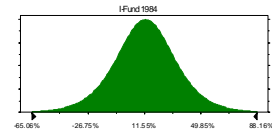
I-Fund 1984

Assumption: I-Fund 1985

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
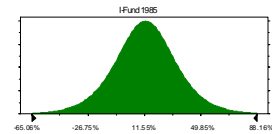
I-Fund 1985

Assumption: I-Fund 1986

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
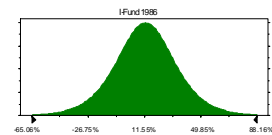
I-Fund 1986

Assumption: I-Fund 1987

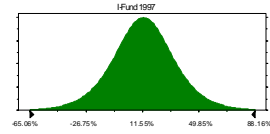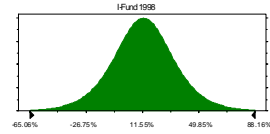Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%
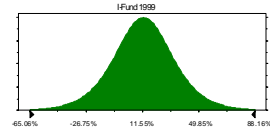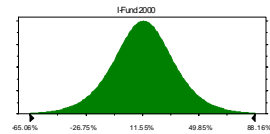
Selected range is from -Infinity to +Infinity
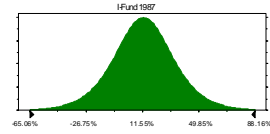
Assumption: I-Fund 1988

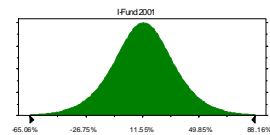Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
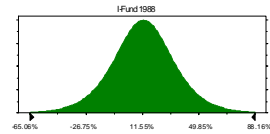
Assumption: I-Fund 1989

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
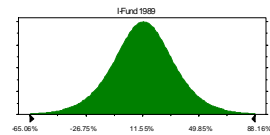
Assumption: I-Fund 1990

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%
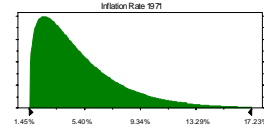
Selected range is from -Infinity to +Infinity
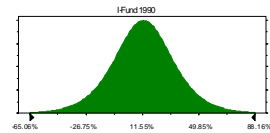
Assumption: I-Fund 1991

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
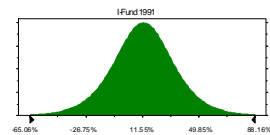
Assumption: I-Fund 1992

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
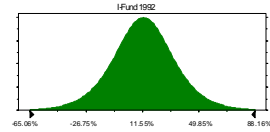
Assumption: I-Fund 1993

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
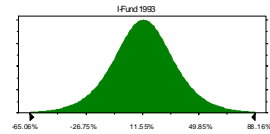
Assumption: I-Fund 1994

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity
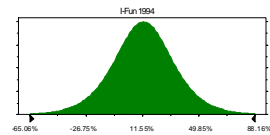
Assumption: I-Fund 1995

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 1996

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 1997

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

I-Fund 1997

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 1998

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

I-Fund 1998

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 1999

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

I-Fund 1999

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 2000

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

I-Fund 2000

Selected range is from -Infinity to +Infinity

Assumption: I-Fund 2001

Logistic distribution with parameters:
Mean   11.55%
Scale   12.77%

I-Fund 2001

Selected range is from -Infinity to +Infinity

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Assumption: Inflation Rate 1971

Gamma distribution with parameters:
Location	1.45%
Scale	2.62%
Shape	1.379462572

Inflation Rate 1971

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1972

Gamma distribution with parameters:
Location	1.45%
Scale	2.62%
Shape	1.379462572

Inflation Rate 1972

Selected range is from 1.45% to +Infinity
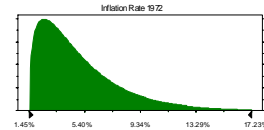
Assumption: Inflation Rate 1973

Gamma distribution with parameters:
Location	1.45%
Scale	2.62%
Shape	1.379462572

Inflation Rate 1973

Selected range is from 1.45% to +Infinity
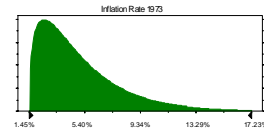
Assumption: Inflation Rate 1974

Gamma distribution with parameters:
Location	1.45%
Scale	2.62%
Shape	1.379462572

Inflation Rate 1974

Selected range is from 1.45% to +Infinity
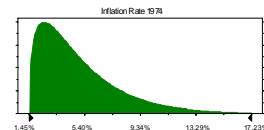
Assumption: Inflation Rate 1975

Gamma distribution with parameters:
Location	1.45%
Scale	2.62%
Shape	1.379462572

Inflation Rate 1975

Selected range is from 1.45% to +Infinity
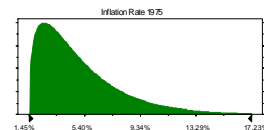
Assumption: Inflation Rate 1976

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572
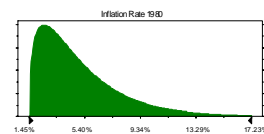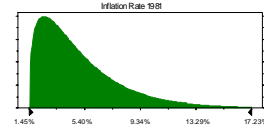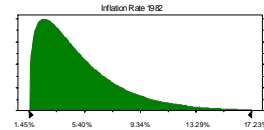
Selected range is from 1.45% to +Infinity
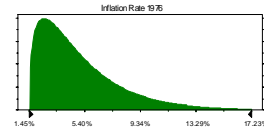
Assumption: Inflation Rate 1977

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity
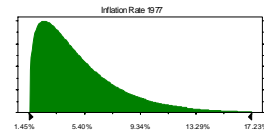
Assumption: Inflation Rate 1978

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
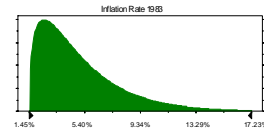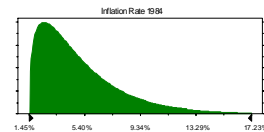Shape   1.379462572

Selected range is from 1.45% to +Infinity
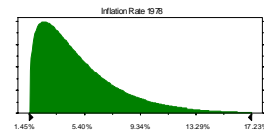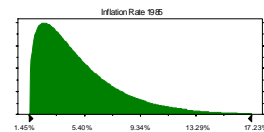

Assumption: Inflation Rate 1979

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity
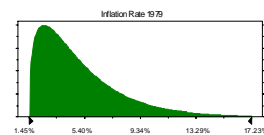
Assumption: Inflation Rate 1980

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

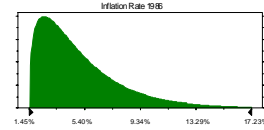169

Assumption: Inflation Rate 1981

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity
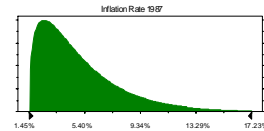
Assumption: Inflation Rate 1982

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1983

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity
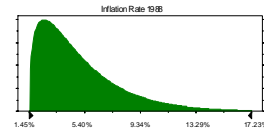
Assumption: Inflation Rate 1984

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity
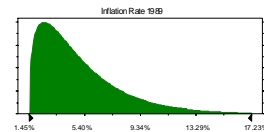
Assumption: Inflation Rate 1985

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

170

Assumption: Inflation Rate 1986

    Gamma distribution with parameters:
        Location   1.45%
        Scale   2.62%
        Shape   1.379462572

Inflation Rate 1986

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1987

    Gamma distribution with parameters:
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        Scale   2.62%
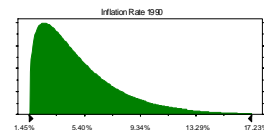   Shape   1.379462572

Inflation Rate 1987

Selected range is from 1.45% to +Infinity

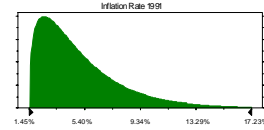**Assumption: Inflation Rate 1988**

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        Scale   2.62%
        Shape   1.379462572

Inflation Rate 1988

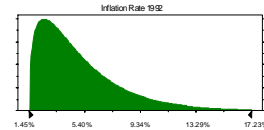Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1989

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        Scale   2.62%
        Shape   1.379462572

Inflation Rate 1989

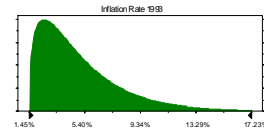Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1990

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        Scale   2.62%
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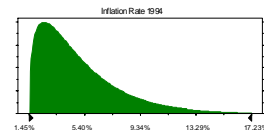

Inflation Rate 1990

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1991

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1992

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1993

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1994

Gamma distribution with parameters:
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Scale   2.62%
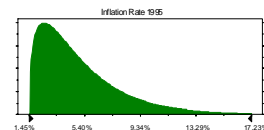Shape   1.379462572

Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 1995

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572
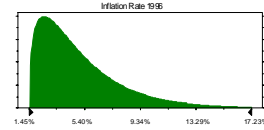
Selected range is from 1.45% to +Infinity

172

Assumption: Inflation Rate 1996

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
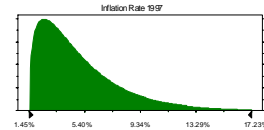Shape   1.379462572

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Assumption: Inflation Rate 1997

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

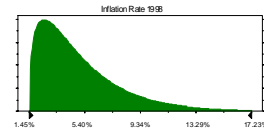**Assumption: Inflation Rate 1998**

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

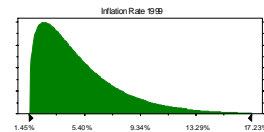**Assumption: Inflation Rate 1999**

Gamma distribution with parameters:
Location   1.45%
Scale   2.62%
Shape   1.379462572

Selected range is from 1.45% to +Infinity

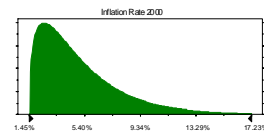**Assumption: Inflation Rate 2000**

Gamma distribution with parameters:
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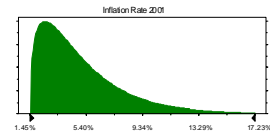Selected range is from 1.45% to +Infinity

Assumption: Inflation Rate 2001

Gamma distribution with parameters:

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Scale	2.62%
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Inflation Rate 2001

Selected range is from 1.45% to +Infinity

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1. REPORT DATE *(DD-MM-YYYY)* 23-03-2004	2. REPORT TYPE **Master's Thesis**	3. DATES COVERED *(From – To)* Jun 2003 – Feb 2004

4. TITLE AND SUBTITLE

A COST ANALYSIS OF THE MILITARY RETIREMENT SYSTEM

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Martin, Kyle, R., Captain, USAF

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)
Air Force Institute of Technology
Graduate School of Engineering and Management (AFIT/EN)
2950 Hobson Way, Building 641
WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION REPORT NUMBER

AFIT/GCA/ENV/04M-06

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
OSD-PA&E
Attn: Dr. David C. Trybula
1800 Defense Pentagon, Room BE798
Washington DC 20301-1800   COMM: (703) 614-3840

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
    APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This research explores possible changes to the current military retirement system. The research contains a detailed explanation of the current military retirement system and its objectives; a summary of the history and past legislation affecting private sector pension plans and the military retirement system; and a discussion of major analytic studies of the military retirement system since 1969 and their impact on the current system. The costs and benefits of three alternatives to the current system are analyzed using a deterministic and stochastic analysis. These alternatives are based on benefit structure changes not explicitly reducing costs. System restructuring would change the emphasis from cutting benefits to keeping costs constant (or lower) with an equal (or greater) benefit level. This restructuring approach is based on three defined contribution options that have varied contribution percentages. The contribution percentages are designed to provide different levels of incentive for continued military service. The analysis demonstrates that each alternative is an attractive consideration for the DoD because the alternatives are aligned with the objectives of the military retirement system, cost the government less to administer, and provide greater benefit annuities to the service member.

15. SUBJECT TERMS
Retirement, Cost Analysis, Monte Carlo Method, Benefits

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Michael A. Greiner, Capt, USAF (ENV)
REPORT U	ABSTRACT U	c. THIS PAGE U	UU	191	19b. TELEPHONE NUMBER *(Include area code)* (937) 255-3636, ext 4588; e-mail: Michael.Greiner@afit.edu